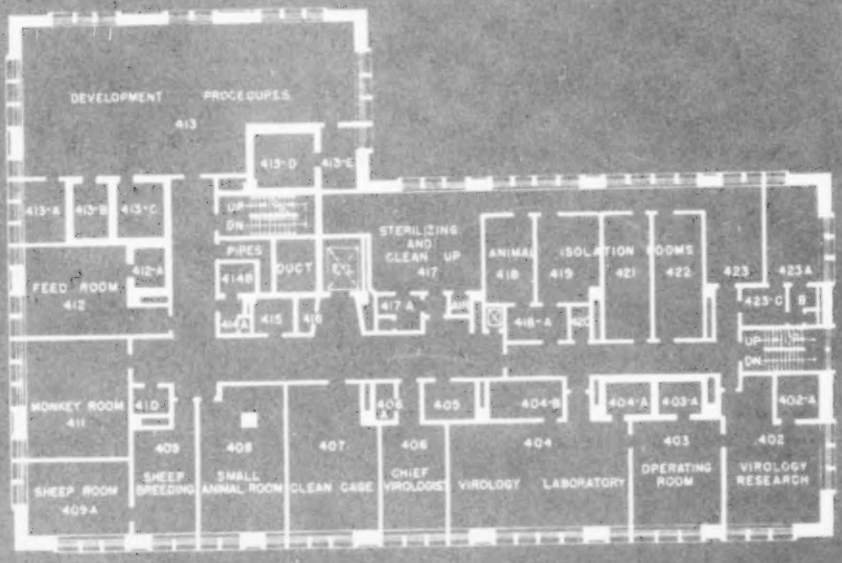
PUBLIC HEALTH REPORTS

In this issue

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

Wisconsin State Laboratory of Hygiene



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frontispiece . . .

The new building for the Wisconsin State Laboratory of Hygiene, located on the campus of the University of Wisconsin at Madison, forms an integral part of the University Medical Center. All the various laboratories of the Wisconsin State Board of Health, which were formerly located in several campus buildings, are now housed under one roof. All laboratory services are departmentalized.

Dr. W. D. Stovall, past president of the Wisconsin State Medical Society, is director of the laboratory, with which he has been associated since 1913 and which was first established in 1903 when bacteriology was still a new-born science. The Wisconsin laboratory was one of the first laboratories in this country to provide clinical pathology services. The laboratory operates under a form of joint control by the Wisconsin State Board of Health and the University of Wisconsin.

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PUBLIC HEALTH MONOGRAPH No. 19 . . . Medical service areas and distances traveled for physician care in western Pennsylvania.

Antonio Ciocco and Isidore Altman.

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Industrial Hygiene in Latin America

By JOHN J. BLOOMFIELD

THE spurt in industrial hygiene activities that began in South America some 5 years back is a story connected with our foreign policy. Latin American countries have been drawing on our experience and our industrial hygienists. There is a West Virginian in sky-high Bolivia, a Texan in Chile, a man from North Carolina in Colombia, New Hampshire men in Peru, and a Californian in Brazil.

Assistance in industrial hygiene is given through the Institute of Inter-American Affairs as part of the cooperative public health program it conducts with ministries of health in Latin American countries. The Institute comes under point four, but only by adoption, for its technical assistance programs started in 1942, and in fact they have provided much of the philosophy and the methods of operation for that program.

Economic Benefit

The economic benefit of industrial hygiene is of great appeal, because the costs of indemnification are high in Latin America compared with the numbers of industrial workers.

Though the industrial working force is small, its accidents and illnesses are costing a great deal of money. Data gathered in detailed studies of Latin American countries indicate that sums spent for indemnification represent from 12 to 15 percent of the national incomes and from 30 to 50 percent of the national budgets.

It can be put this way—their social legislation has out-run their public health work. The legislation, though well conceived, is more costly than it should be for lack of the complementary preventive health work that keeps people well and on the job. These countries have had long years of experience with legislation for compulsory sickness insurance, old-age and death benefits, workmen's compensation for accidents and occupational diseases, and similar provisions which cover the workers. The emphasis, however, has been on paying them for losing their health rather than on keeping them in health and on the job.

They are exposed to many preventable hazards on the job. Such diseases as silicosis, metal poisoning, and toxic conditions resulting from exposures to gases, vapors, and fumes are common. Industrial hygiene practices aimed at controlling these hazards are practically unheard of.

Latin American governments are getting in on a well-developed movement in the United States and can draw on a vast body of experience in the control of occupational diseases and the improvement of health in industry. They frankly acknowledge their need for technicians

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Mr. Bloomfield, industrial hygiene specialist with the Institute of Inter-American Affairs at Lima, Peru, has had long association with the Public Health Service and its Division of Occupational Health. He has extensively traveled and surveyed industrial hygiene activities in the Americas. *The paper here presented in somewhat condensed form was presented at the 15th Annual Meeting of the American Conference of Governmental Industrial Hygienists, Los Angeles, Calif., April 20, 1953.*

in this field and are turning to us for that kind of assistance. This is the kind of role that fits the United States well—to share its technicians with other nations. By this role we demonstrate our belief that science and technology should be used for the benefit of mankind.

In the development of industrial hygiene programs in Latin America, the principles upon which the Public Health Service has based its work with the States are followed closely. The Public Health Service has aimed at the establishment within a State health department of a nucleus of trained personnel with essential field and laboratory equipment. These units are responsible for providing services to local industries and for aiding large companies in developing their own industrial hygiene programs.

If there is a good public health program in a community, the development of an industrial hygiene program is that much easier. In many of the regions, however, there are no community health programs, and it has been more practicable, therefore, to develop centralized industrial hygiene programs under the direction of experienced United States personnel. It can best be explained by telling what has been done in Peru.

Peru's Program

The Peruvian department of industrial hygiene was established in 1940 in the Ministry of Public Health, but for several years it lacked a trained staff with equipment to do the job. In 1947, the Minister of Public Health requested an independent survey of industrial health problems. In that same year, in March, the Peruvian Government passed law 10833, which made a preventive program of industrial hygiene mandatory and laid a tax on industrial payrolls to support it. The Peruvian Government put up all the money for operations, asking only for technicians. Ours was the job of administering the funds and running the department of industrial hygiene, and we are still at it.

We had to start from scratch and train a staff. One of our engineers was assigned to Peru and began the training of the first engineer. A young Peruvian physician working in the cooperative health program was given a fellowship by the Institute of Inter-American Affairs to study industrial medicine—first at Harvard and then at the laboratory at Saranac Lake. The Institute sent a consultant chemist, who established an industrial hygiene laboratory in the department and began the training of three graduate chemists from San Marcos University. A house was renovated for the department, and we are still in it, though a new building one of these days is in prospect.

In April 1949, the first survey team went to Cerro de Pasco, 14,000 feet high in the Andes, to make its first study. The Cerro de Pasco corporation had agreed to be the "guinea pig" and had made facilities available where the team members could live and set up a clinic and a laboratory.

That was 4 years ago. Today the Peruvian department of industrial hygiene has a staff of approximately 50 persons, of whom about half are professionals. They have all been trained on the job, and 4 of the physicians and 2 of the engineers have completed postgraduate work in the United States. One chemist has finished a year's training at the Industrial Hygiene Laboratory of the Public Health Service in Cincinnati. Other members of the staff are learning English against the time when they will be enrolling in one of our schools of public health or trying to catch on to operations in one of our industrial hygiene departments.

The director of the department of industrial hygiene is from the United States, assigned by the Institute. His assistant is a Peruvian physician, who has studied industrial medicine in the United States.

The staff of the department up to the present time has made medical and engineering studies in about 80 industries, which include copper mines, gold mines, coal mines, the largest and highest vanadium mine in the world, and also smelters and concentrators. More than 6,300 workers have been examined on these surveys.

A total of 3,200 medical examinations have also been made of workers claiming compensation for disability from occupational disease. The department makes these examinations for the labor courts which are adjudicating claims.

This service is a means of introducing a real medical evaluation into the process, and it also helps to establish the department as the medical authority in occupational disease.

The laboratory has meanwhile developed to the point where it is able to train chemists for neighboring countries. A man has been trained there for Chile, 1 for Colombia, and 2 for Brazil. These four have finished their training and returned to their countries, and are now responsible for developing industrial hygiene laboratories. They have the help of our consultant chemist who is at the service of all the countries that need him.

The Peruvian department of industrial hygiene has worked mainly in the mining areas with the pneumoconioses as the chief target. Law 10833, passed in March 1947, specified that the program start in those areas and with that target, and such an emphasis is important not only to Peru but also to the United States, for we look to these high mining areas for such strategic minerals as lead, copper, antimony, and vanadium. Thus, anything we can add to the stability of labor benefits not only the South American countries but also the United States.

And here is a very interesting point about that labor force. It is a limited group of men—about 26,000—who have the physiological makeup to do hard work in the high altitude. High altitude men in Peru are Andean Indians who have big chests, outsize hearts and lungs, and extra millions of red blood corpuscles and extra quantities of blood. No others need apply for the hard work of mining at 14, 15, and 16 thousand feet, for they could not do it. Thus, the Indians, by their special physiology, still hold the key to this ancient wealth of the Incas.

Nearly all the miners are illiterate. Many of them speak only Quechua, an Indian tongue. However, they know silicosis, which they consider a tuberculosis of the mines. They have seen what it has done to men before them, and are afraid of it. Today many young men of the high Andes who would ordinarily be miners are refusing the occupation.

Silicosis Cases Decrease

The first 2,837 medical examinations made in the course of the surveys revealed silicosis in more than 13 percent of those examined. It is too soon to produce a graph showing silicosis sliding downhill, for first the reservoir must be lowered. Public health personnel know that the disease is taking the downward path, however, because of the controls being instituted over the dust. Industries are responding handsomely, inviting the department's men back to help in carrying out the recommendations they made following the survey. Big companies are putting in their own health programs and looking to the department for guidance.

A plant physician from a smelter high in the Andes came to our Lima office one day last December. He had requested that someone from the department come to the plant to advise him on respirators, but before anyone could be sent he came down to Lima and visited the department. He wanted to know what types of respirators to buy and wanted advice also on sterilizing equipment and the daily handling of the devices. The company was buying 4,000 respirators to use as temporary controls until permanent ones could be installed.

The response from labor is equally gratifying. The unions used to ask for extra pay for the men for hazardous work and let the problem go at that. Now they are inviting the department to send in its specialists to evaluate the environment and are asking for health talks and motion pictures and anything else for the enlightenment of the worker.

The department is using its surveys to stimulate general public health work. A sanitary engineer goes along with the team to make a study of the community sanitation facilities. The physicians in examining workers in the course of a survey offer immunizations to everybody—not just the workers but their families and neighbors. They also evaluate diets and carry on health education. In places where there is a single large industry, the plant program, by putting out such shoots, may promote in the end a general health program.

Delayed Blood Sugar Determinations

—*Evaluation of a Blood Preservative*—

By WALTER M. BOWMAN, Sc.M., and PHILIP E. ENTERLINE, B.B.A.

EACH YEAR, millions of persons in the United States have blood tests for syphilis. If it were possible for an additional blood specimen to be drawn and shipped to a central laboratory at the same time, and there tested for glucose content, a diabetes case-finding program could be operated at little additional expense. Probably the most important technical problem would be preservation of the glucose content of the whole blood until the glucose determination could be made.

It is well known that the glucose content of whole blood disappears when the blood is stored for any period of time. Sunderman and others (*1*) stated "at room temperature glucose disappears from oxalated blood at an approximate rate of 5 percent per hour." A number of studies of various blood preservatives have been reported, often with contradictory results (*2*, *3*, *4*, *5*). Most of these studies indicated that sodium fluoride apparently has desirable properties as a preservative. In the prevention of glycolysis, Baldwin (*6*) showed that sodium fluoride inhibits enolase, the 11th enzyme in enzymic glycolysis, but does not inactivate the other enzymes. The most promising inhibiting agent for all enzymes seemed to be a combination of 1 mg. of thymol with 10 mg. of NaF per milliliter of whole blood, as reported by Sander (*2*). (Sodium fluoride in this amount is a satisfactory anticoagulant.)

The West Virginia State Health Department and the Public Health Service cooperatively tested this preservative to determine its usefulness in a diabetes case-finding program involving a delayed glucose determination. The results are presented in this paper.

At the outset, it was decided to use a method of blood glucose determination which was specific for true glucose. The method had to be highly reproducible and adaptable to testing a large volume of specimens. The Nelson method (*7*) seemed to meet these criteria because it is not as subject to interference from saccharoids as some of the older methods, and stability of color makes it possible to examine large numbers of specimens without danger of fading. Certain modifications of this method were made to increase its reproducibility and adaptability to large numbers.

In measuring changes in the glucose content of blood, the reproducibility of the test itself must be estimated. If reproducibility were poor, it would be difficult to decide whether deviations from some previously observed blood sugar level were due to inability to reproduce test results or due to actual changes in the blood

Mr. Bowman is chief of the microbiological and chemical section of the hygienic laboratory division, West Virginia State Department of Health. Mr. Enterline is assistant chief of the Program Analysis Section, Division of Chronic Disease and Tuberculosis, Public Health Service.

sugar level. Test reproducibility, as it applies to the experiments described here, in the main, is affected by two types of error: (*a*) the inherent error of the test itself, that is, the differences in glucose values which are observed in simultaneous replications on the same blood sample; and (*b*) the day-to-day error of the test, such as day-to-day changes in solutions used, calibration of equipment, temperature, and humidity, that affects test results. Error refers to the standard deviation of recorded results around the mean of these results (assumed to be the true glucose value). Estimates of error can therefore be interpreted as the range of deviations which would occur as the result of factors other than changes in glucose level in 68 out of 100 observations, while 2.58 times this error is the range which would occur in about 99 out of 100 observations. (The distribution of differences around assumed true glucose values appeared sufficiently normal to warrant this interpretation.)

Day-to-day error was estimated by performing the Nelson test on standard dextrose solutions on several days. The results obtained on five replications on standard solutions, representing five glucose levels tested on three different days, are shown in table 1. From the results of this experiment, both the inherent error and the day-to-day error of observed results on standard solutions could be estimated at each glucose level. Tests for statistical significance (F test applied to each glucose level, 2 and 12 degrees of freedom) show that the day-to-day error is probably negligible or nonexistent—there are no day-to-day changes in solutions used, calibration of equipment, and so on, that materially affect test results. In the experiments described, therefore, estimates of the inherent error of the Nelson test have been used to measure reproducibility. Thus, the standard deviations shown at the bottom of table 1 are measures of the reproducibility of the Nelson test when used on standard solutions.

Although incidental to the experiments described here, table 1 illustrates an important point in the establishment of the calibration curve. Even with quantitatively known dextrose solutions, a single observation will frequently deviate from the expected value. As can be seen by the magnitude of the standard deviations shown at the bottom of the table,

Table 1. Observed replicate values for 3 different days on dextrose solutions of known glucose content

Observed values	Replication No.	Known glucose value (mg. percent)				
		50	100	150	200	250
1st day	1	51. 2	100. 6	149. 4	195. 5	255. 9
	2	50. 0	99. 4	151. 2	204. 1	250. 0
	3	48. 8	100. 0	150. 6	204. 1	254. 7
	4	50. 0	100. 0	153. 5	200. 0	248. 8
	5	49. 4	100. 0	150. 0	197. 1	246. 5
2d day	1	49. 4	101. 2	151. 8	198. 8	250. 0
	2	48. 2	100. 6	147. 6	197. 1	248. 8
	3	48. 8	98. 2	144. 7	201. 2	248. 2
	4	48. 8	102. 9	152. 9	198. 2	250. 6
	5	51. 2	100. 6	150. 6	201. 8	248. 2
3d day	1	48. 8	101. 2	147. 1	195. 9	257. 6
	2	48. 2	100. 0	152. 4	201. 2	247. 1
	3	51. 2	100. 0	151. 8	201. 2	245. 9
	4	48. 8	98. 8	150. 0	198. 8	252. 9
	5	51. 2	97. 6	151. 8	197. 1	254. 1
Mean value		49. 6	100. 1	150. 4	199. 5	250. 6
Range of value		48. 2	97. 6	144. 7	195. 5	245. 9
		51. 2	102. 9	153. 5	204. 1	257. 6
Standard deviation (inherent error)		1. 13	1. 28	2. 38	2. 74	3. 60

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the range of these deviations tend to increase with the height of the glucose level, so that multiple observations are particularly important at the higher levels.

In determining blood sugar levels in the experiments reported below, quantitative dextrose solution controls for a glucose control of 100 mg. percent were always incorporated with each "run" of blood specimens. When the reading on the control in a given run deviated from the expected value by more than 3 mg. percent, procedures were checked and specimens were retested on the assumption that a procedural mistake had occurred. (This tended to minimize day-to-day error, if it existed, in the experiments described.)

Experiment With Replications

The following experiment was designed to evaluate the effectiveness of 10 mg. NaF and 1 mg. thymol per milliliter of blood in preserving the glucose content, as measured by the Nelson method.

Twelve tubes of blood were collected in B-D Vacutainers from each of six donors. Six of each donor's tubes contained 50 mg. of NaF and 5 mg. of thymol; the remaining six contained only 10 mg. of potassium oxalate as an anticoagulant. The fluoride and thymol were thoroughly pulverized and were added to the tubes with a microspatula calibrated to hold 55 mg. of powder. The tubes were evacuated for a volume of 5 ml. immediately before use to insure sufficient vacuum at the time of collection. Sterility was not maintained, but gross contamination was avoided by wiping the outside of the tubes with 70 percent ethanol before they were opened for the addition of the powder.

Before the tourniquet was applied, the donor's arm was sponged with iodine-ethanol, and the needle with holder attached was introduced into the vein with the Vacutainer in place. The tourniquet was removed and the tubes containing NaF-thymol and those containing oxalate were filled alternately. The tubes were inverted and shaken 6 to 8 times, as they were filled, to mix the blood with the preservative or the anticoagulant.

The tubes of blood from each donor were divided into 3 groups, each comprising 2 oxalated tubes and 2 tubes containing NaF-thymol. One group was examined exactly 1 hour after collection. The second group was mailed to a town 135 miles away; then remailed to the laboratory and tested 96 hours after collection. The third group was kept, without agitation, in the dark at a constant room temperature, and tested 96 hours after collection (except blood from donor No. 4 which was tested at 144 hours). Within each group, 3 independent blood sugar determinations were made from each tube. Since 2 tubes were treated and preserved identically, 6 replications for each observation were effected. The mean results of the 6 replications on blood from each donor are shown in table 2 along with their standard deviation from this mean.

As would be expected on the basis of Sunderman's report (*1*), the glucose content of unpreserved specimens dropped considerably; the amount of glucose remaining at the end of 96 hours varied with the initial level. It is evident that glycolysis in unpreserved specimens started immediately if we assume that the true glucose content at the time the blood was drawn was about that observed at 1 hour in the preserved specimens. (This assumption is supported by the fact that, as will be shown later, blood sugar levels in preserved specimens remained relatively constant with the passage of time.) As shown in table 2, the mean results obtained on the six replications tested at 1 hour were lower on all unpreserved specimens than on preserved specimens. They were, in fact, about 5 percent lower on the average, as suggested by Sunderman. In general, the differences between results at 1 hour on preserved and unpreserved specimens are highly significant statistically, indicating a real difference in sugar content. (F test with 1 and 10 degrees of freedom, applied to 1-hour observations on each donor.)

This experiment provided some information on whether changes occurred in the glucose content of blood preserved with NaF-thymol when tested at 1 hour, when mailed and tested at 96 hours, or when tested after being stored at room temperature for 96 hours. If the preservative were completely effective, one would expect the mean values for preserved blood from each

Table 2. Means and standard deviations of 6 replicate glucose values on preserved and unpreserved specimens from 6 donors showing results before and after mailing and storage

Donor No.	Preserved specimen (sodium fluoride-thymol)						Unpreserved specimen (potassium oxalate)					
	1 hour		Room temperature 96 hours		In mail 96 hours		1 hour		Room temperature 96 hours		In mail 96 hours	
	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.	Mean	S. D.
1	100. 7	0. 52	100. 3	1. 03	101. 5	1. 38	96. 5	1. 38	<5	------	<5	------
2	77. 8	1. 72	77. 3	2. 07	72. 5	2. 59	73. 3	1. 21	<5	------	<5	------
3	73. 5	1. 05	75. 7	2. 16	74. 7	0. 52	63. 7	1. 86	<5	------	<5	------
4	154. 3	2. 34	[1] 172. 8	2. 79	[1] 170. 0	4. 77	145. 5	3. 89	[1]<20	------	[1]<10	------
5	336. 5	3. 33	329. 0	3. 29	332. 5	4. 28	326. 2	1. 33	173. 8	4. 07	224. 8	2. 79
6	220. 5	4. 18	201. 5	3. 21	202. 7	2. 73	213. 3	4. 45	52. 5	3. 02	137. 5	2. 51

[1] 144 hours after withdrawal.
S. D.—Standard deviation.

donor (table 2) to be not significantly different from each other. There were numerical differences. Application of a test for statistical significance to observations on preserved blood from each donor indicates that a change probably occurred in preserved blood from 3 of the 6 donors. (F test with 2 and 15 degrees of freedom.) Two of these changes were decreases and 1 was an increase.

It is apparent that many of the factors which affect the glucose content of blood were uncontrolled in this experiment. These could not be identified. No doubt some of these factors are inherent in the donor's blood, as suggested by Bose and De (*8*), while others are probably due to differences in handling specimens. Stored and mailed portions of preserved specimens generally differed considerably less from one another than either differed from the initial value, indicating that time had more effect than did shipment versus storage.

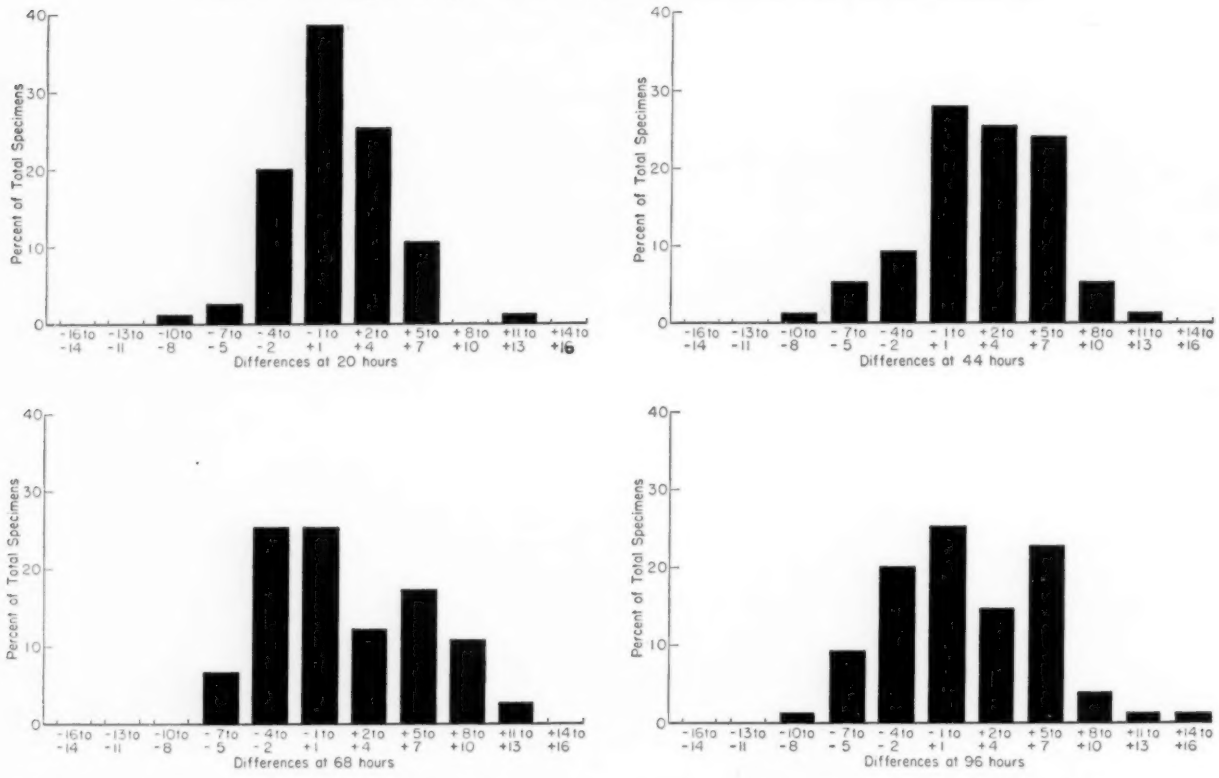
The experiment summarized in table 2 provides estimates of the inherent error in the Nelson test which, in the absence of day-to-day error, are measures of its reproducibility when used on blood—measures which were used in the test for statistical significance. Data shown in table 1 provide measures of the reproducibility of the Nelson test when used on standard solutions. These are shown as standard deviations on both tables and demonstrate a direct relationship between reproducibility and glucose level. In general, reproducibility appeared to be slightly poorer on blood than on standard solutions. This was to be expected since more steps are involved in making glucose determinations on blood than on standard solutions. Roughly, it would appear from table 2 that the Nelson test can measure the glucose content of blood within 1.5 percent of the true glucose level 68 times out of 100, while 99 times out of 100 (2.58 S. D.) it can measure within 4 percent. This estimate of reproducibility was of considerable importance in deciding whether changes in glucose content of blood actually occurred and was used in evaluating the results of further experiments described below.

Stored Specimens

In the experiment just described, it was possible that bloods from each donor, preserved and handled under identical conditions, would show the same behavior pattern with respect to changes in glucose content. This was not the case. In blood from 1 donor the glucose content increased, in 2 it decreased, and in 3 it did not change significantly. In effect then, this experiment gave only 6 observations on what turned out to be an important source of variation and, while showing that the combination of NaF and thymol is generally effective as a preservative, the experiment provided inadequate information on the frequency with which deviation in individual specimens would probably occur when used in large-scale projects.

To learn more about the behavior of indi-

Figure 1. Glucose differences in milligrams per 100 ml. of blood between initial and subsequent Nelson readings, 75 preserved specimens stored at room temperature


Percent of Total Specimens
Differences at 20 hours
Differences at 44 hours
Differences at 68 hours
Differences at 96 hours

vidual specimens and to obtain more information regarding the manner in which preserved bloods tend to behave with the passage of time, specimens from 97 donors were collected in tubes containing the preservative and were examined at various intervals up to 120 hours. All specimens were drawn as in the preceding experiment. Examinations were made on 75 of these specimens 1 to 4 hours after collection, then at 20, 44, 68, and 96 hours; on 22 specimens examinations were made 1 to 4 hours after collection, then at 20, 44, and 120 hours. Between examinations, the specimens were kept in the dark at a constant room temperature and were not agitated except for mixing to permit glucose determination.

On the basis of the reproducibility of the Nelson test, estimated above to give results within 4 percent of the true value 99 times in 100, differences of 6 percent or more probably represent real changes in the glucose content of the specimens (when a ratio of the difference between specimens to the standard error of the difference in excess of 2.58 is considered significant). At the last test, the observed glucose content on 43 of the 97 specimens deviated from the initial content by as much as this amount. It is probable, therefore, that the glucose content actually changed in nearly half of these specimens. Of these 43 changes, all but 6 were increases.

The results on the specimens stored for 96 hours were considerably better than those stored for 120 hours. Of the 75 specimens stored for 96 hours, only 29 changed significantly; of the 22 specimens stored for 120 hours, 14 changed significantly (all increases).

Figure 1 shows the glucose differences observed between the first test and the 20-, 44-, 68-, and 96-hour tests on the 75 specimens on which the last test was made at 96 hours.

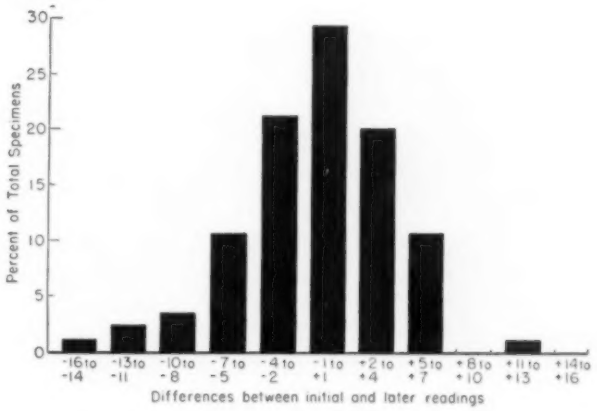
Shipped Specimens

An experiment was conducted to approximate the conditions under which the preservative might be used in a diabetes case-finding program and to obtain further information on the

effect of shipping. During a 30-day period in the late spring of 1952, 85 blood specimens were collected in tubes containing the preservative. A portion of each specimen was examined shortly after collection at the West Virginia Hygienic Laboratory. The remaining portion was mailed to a point 135 miles away and remailed to the West Virginia Hygienic Laboratory. This subjected the specimens to more varied handling than would normally occur in transmitting specimens from a collection point to a central laboratory. From the time the specimens were collected until they were examined the second time, they had been agitated a minimum of 18 times and had traveled by truck 9 times and by train twice. The time between the testing of the first portion and the testing of the second portion varied from 48 to 120 hours.

Five of the 85 specimens apparently changed by as much as 10 percent and 21 by as much as 6 percent. Again, lack of test reproducibility probably would not account for those deviations in excess of 6 percent, and it is likely that the glucose content actually changed in about a quarter of these specimens. Generally, this group of specimens behaved better than the 97 stored specimens, partly due, no doubt, to the shorter period between the first and last test. The results of testing the 120-hour specimens were relatively poor. Of 30 specimens tested at 120 hours, the glucose content of 10, or a third, had changed, whereas, of the 55 tested at or before 96 hours, the glucose content of 11, or a fifth, had changed. The distribution of differences between the first and last test on these 85 specimens is shown in figure 2.

Figure 2. Glucose differences in milligrams per 100 ml. of blood between initial and 48–120-hour Nelson readings, 85 preserved shipped specimens.



Discussion

Experiments involving 188 different blood specimens and 849 independent blood sugar determinations indicate that changes in the glucose content of whole blood preserved with NaF-thymol occurred when these specimens were stored at a constant room temperature or shipped and then were tested as long as 120 hours after collection. For the 135 stored and shipped specimens tested within 96 hours, the preservative appeared to be quite satisfactory. Of these, it is estimated that the glucose content actually changed in less than a third (in 42). These changes were small (only 6 were 10 mg. percent or greater) and were about equally divided between increases and decreases in glucose content. On the other hand, the glucose content changed in nearly half (25) of the 53 specimens stored for 120 hours or more; 22 of these changes were increases.

It was concluded that, beyond 96 hours, NaF-thymol loses some of its effectiveness and may actually cause increases in the glucose content of some specimens. However, for blood sugar determinations delayed for 96 hours or less, the preservative appears adequate, and the changes it permits are not the type which would cause any appreciable diagnostic error. Subsequent use of NaF-thymol in a statewide diabetes detection program in public health clinics, involving the collection of specimens in parallel with those drawn for syphilis and testing them for glucose content in the State hygienic laboratory at Charleston, W. Va., has shown the preservative to be quite satisfactory.

Summary and Conclusions

1. A series of experiments is presented to determine the value of the combination of 10 mg. of sodium fluoride and 1 mg. of thymol per milliliter of whole blood in maintaining the glucose content of blood, under conditions which would be characteristic of a diabetes case-finding program, conducted in conjunction with blood-collection programs for venereal disease.

2. As a basis for evaluating observed changes in the glucose content of blood when tested at varying intervals after being drawn, an estimate of the reproducibility of the Nelson test for glucose determinations was made. This estimate indicates that results obtained by the Nelson test will be within 4 percent of the actual glucose value 99 times in 100 and that differences between observed values in excess of 6 percent probably represent real differences in the glucose content of the specimen.

3. In three experiments involving a total of 188 different blood specimens and 849 independent glucose determinations, statistically significant increases and decreases were observed in the glucose content of stored and shipped specimens containing the preservative.

4. For periods up to 96 hours, it was estimated that less than a third of the blood specimens actually changed in glucose content. These changes were small. They were about equally divided between increases and decreases in the glucose content of specimens and would probably be of little or no clinical significance in diabetes case-finding programs.

5. The preservative was not considered satisfactory for periods beyond 96 hours.

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A detailed version of this paper, containing a more complete description of procedures and results, may be obtained by writing to the Hygenic Laboratory Division, West Virginia Department of Health, Charleston, W. Va.

Training Course in Epidemiology for Nurses

The Communicable Disease Center of the Public Health Service is offering a refresher course in communicable disease control to public health nurses and instructors in communicable disease nursing, April 26 through May 14, in Atlanta, Ga.

The course is designed to give an understanding of the problems of present day communicable diseases and their control. Epidemiological principles and techniques will be emphasized. Field experience under supervision will be available to a limited number of students following the completion of the course.

For further information and applications, individuals should write to the director of public health nursing of their own State health department or to the Medical Officer in Charge, Communicable Disease Center, Attention, Chief Nursing Consultant, 50 Seventh Street NE., Atlanta, Ga.

Studies on Dental Care Services For School Children

—*Third and Fourth Treatment Series, Richmond, Ind.*—

By GEORGE E. WATERMAN, D.D.S., and JOHN W. KNUTSON, D.D.S., Dr.P.H.

DURING the first 2 treatment series of the Richmond (Ind.) dental care study project, an average of 4,600 school children, 5 through 16 years of age, received complete dental care (*1*). The study was designed to give dental care services to all school children enrolled in kindergarten through the 9th grade. The project was started in December 1946, and 4 consecutive treatment series were completed 5 years later. A treatment series consisted of examination and treatment of dental defects of all eligible children whose parents requested treatment. Prophylaxis and topical fluoride treatments were included in each series.

Dr. Waterman, formerly assistant chief of the Division of Dental Public Health, Public Health Service, directed the dental research care program in the Richmond, Ind., schools. He is now chief dental officer of the United States Coast Guard, with headquarters at Washington, D. C. Dr. Knutson, an Assistant Surgeon General, is the chief dental officer of the Public Health Service.

Drs. Waterman and Knutson reported on the first and second treatment series of the Richmond dental care study project in the June 1953 issue of Public Health Reports, p. 583.

Review of the First Two Series

Baseline data for children participating in the first treatment series indicated that 75 percent had 1 or more decayed permanent teeth, more than 13 percent had 1 or more missing teeth, only 17 percent had 1 or more filled permanent teeth, and 34 percent of the primary teeth were found to be carious. The first treatment series was completed in 24 months. During this time, an average of 4.3 dentists completed dental care for 90 percent of the children treated. The number of dentist man-hours required to complete treatment for each child was 2.88. An average of 2.17 permanent and primary teeth were treated per dentist man-hour.

In the second treatment series, extending over 20 months, approximately 68 percent of the children treated had 1 or more decayed permanent teeth. The average annual increment of decayed permanent teeth between the beginning of the first and second series was 1.19 teeth per child. Complete dental care was given to 98 percent of the group undergoing treatment by an average of 3.9 dentists. The average number of dentist man-hours required to complete treatment of each child in the second series was 1.86.

Performance data on the third and fourth

Table 1. Age distribution of all children examined, by patient status, 3d and 4th treatment series, Richmond, Ind.

Age last birthday	3d treatment series			4th treatment series		
	Patient status		All children	Patient status		All children
	Clinic	Private		Clinic	Private	
All ages	4, 929	844	5, 773	4, 963	873	5, 836
5	468	58	526	437	58	495
6	556	71	627	505	70	575
7	604	79	683	604	74	678
8	535	79	614	542	70	612
9	530	86	616	549	78	627
10	485	75	560	521	83	604
11	458	86	544	500	83	583
12	385	66	451	394	85	479
13	404	88	492	398	97	495
14	312	106	418	321	100	421
15	163	44	207	165	64	229
16	29	6	35	27	11	33

treatment series will be presented here. (For a report of the design of the Richmond dental care study project, and the complete results of the first two treatment series, see reference *1*.)

The Followup Program

The dental health education program provided by a full-time educator was continued throughout the duration of the study project. The program consisted of illustrated lectures, moving pictures, puppet shows, pamphlets and poster displays on dental health. It was directed toward all school children in the elementary through junior high school grades. Lectures, movies, and dental health education materials were also made available to PTA groups. A followup program for children not receiving treatment in the clinics provided a fairly accurate account of these children as well as of those children who were receiving treatment. Repeated home calls were made, and conferences with the individual teachers were held in an attempt to have every child visit his dentist regularly if his parents preferred that he not participate in the school clinic program. Approximately 6 percent of the school population received treatment regularly in private dental offices; 7 percent would not seek treatment regardless of the source.

Clinical Routine

As in the two previous treatment series, the entire school population was examined. At the beginning of each treatment series, "request for treatment" forms were issued to all pupils whether or not they had previously participated in the clinic program.

Since the backlog of dental defects in permanent teeth had been corrected for those children who participated in the study project during the first 2 treatment series, these children required correction only of the carious defects that had developed during the 20-month interval required to complete the second series. Similarly, the children in the fourth series who had received completed treatment in the third series required only correction of the increment of carious defects that had occurred during the 15 months required to complete treatment of the third series. In addition to the increment of carious defects, there was the backlog of carious defects resulting from an influx of children who enrolled in school for the first time during the third and fourth series. Most of these children were in the 5-, 6-, and 7-year age groups.

In the third treatment series, 1,070 children or 22 percent of the treated group were new children who had not previously received clinic care. In the fourth treatment series, there were 859 new children, or 17 percent of the treated

group. Each child was given a prophylaxis during each treatment series. A series of 4 topical fluoride treatments was given each new child participating in the clinic program, and the series was repeated after 3 years.

Third Treatment Series

During the third treatment series, 5,773 children between 5 and 16 years of age (95 percent of all Richmond school children enrolled in kindergarten through junior high school) were given dental examinations. A total of 4,929, or 85 percent of the group examined, requested and received treatment (see table 1).

This report, like that on the first two treatment series, is primarily concerned with dental care service—baseline and performance data are, therefore, limited to those children who took part in the clinical care program.

To establish an accurate means of measuring and expressing work load for the Richmond dental care study, all teeth requiring fillings, whether or not they had previously been filled, are counted as "carious." Also counted as carious are teeth for which extraction is indicated. X-rays were used at the discretion of the individual dentists. Bite-wing X-rays were made for 17 percent of the children treated in the third and fourth treatment series.

Table 2. Dental caries prevalence in permanent teeth of children, 3d and 4th treatment series, Richmond, Ind.

Age last birthday	Number of teeth per child						
	Carious	Filled	Carious and/or filled	Missing			DMF
				Total	Extracted	Extractions indicated [1]	
3d treatment series							
5–16 [2]	1.63	4.01	5.26	0.32	0.28	0.04	5.54
5	.14	.00	.14	.00	.00	.00	.14
6	.61	.10	.69	.01	.00	.01	.69
7	1.13	.87	1.88	.02	.01	.01	1.89
8	1.15	1.99	2.89	.03	.02	.01	2.91
9	1.21	2.76	3.66	.06	.04	.02	3.70
10	1.45	3.27	4.34	.14	.09	.05	4.43
11	1.99	4.15	5.68	.24	.19	.05	5.87
12	2.49	4.95	6.95	.35	.30	.05	7.19
13	2.59	6.64	8.55	.42	.38	.04	8.93
14	2.81	7.52	9.58	.61	.50	.11	10.08
15	2.58	7.89	9.74	1.04	.95	.09	10.69
16	1.45	7.97	9.03	1.03	.93	.10	9.97
4th treatment series							
5–16 [2]	1.32	4.28	5.22	0.29	0.27	0.02	5.48
5	.13	.01	.14	.00	.00	.00	.14
6	.57	.18	.71	.00	.00	.00	.71
7	.94	.88	1.75	.01	.01	.00	1.76
8	1.04	1.94	2.75	.04	.02	.02	2.76
9	.87	2.83	3.40	.05	.03	.02	3.43
10	1.10	3.32	4.09	.12	.12	.02	4.19
11	1.46	4.32	5.43	.20	.16	.04	5.58
12	2.03	5.45	7.03	.30	.25	.05	7.25
13	2.39	7.12	8.76	.39	.35	.04	9.11
14	2.04	7.88	9.25	.59	.56	.03	9.81
15	1.58	8.79	9.77	.72	.70	.02	10.47
16	1.67	8.59	9.52	1.07	1.07	.00	10.59

[1] Also included in "Carious" and "Carious and/or filled."
[2] Average of the rates for ages 5–16.

Caries Prevalence

An average annual increment of 0.91 new decayed permanent teeth per child occurred during the interval between the second and third treatment series. Fifty-one percent of the children in the clinic group had 1 or more decayed permanent teeth. Age-specific DMF (decayed, missing, and filled) rates, did not change materially from those of the first and second treatment series. The average for all age groups (5–16 years) was 5.54 DMF teeth per child, of which 1.63 were carious and 4.01 were filled, as compared with 2.87 carious to 3.32 filled teeth per child in the second treatment series (see table 2 and figure 1). Sixty-one percent had 1 or more filled teeth, as compared to 52 percent in the second treatment series. The continued reduction of the number of teeth indicated for extraction reflects the regularity of complete care during the previous treatment series. Nine percent of the children had 1 or more missing teeth, or a total of 774 missing teeth; in addition, 158 teeth were indicated for extraction.

Twenty-three percent of the primary teeth examined were carious. The highest average (4.86 carious teeth) per child was found in the 5-year-old group during this third series,

Figure 1. Dental caries prevalence in permanent teeth, 3d treatment series, Richmond, Ind., ages 5–16.

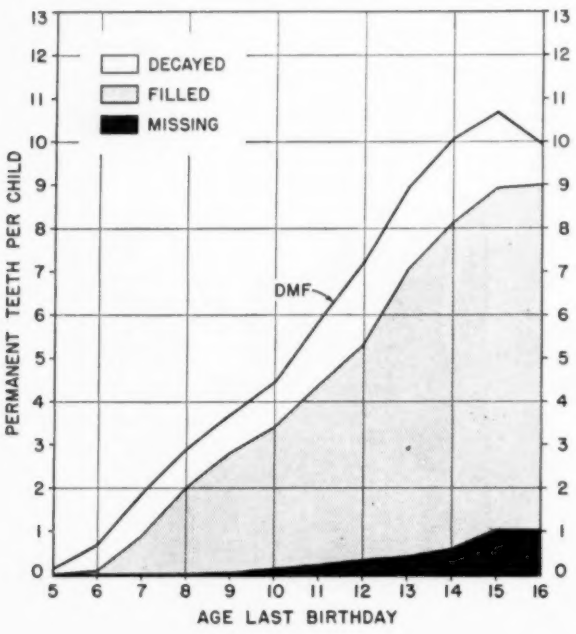
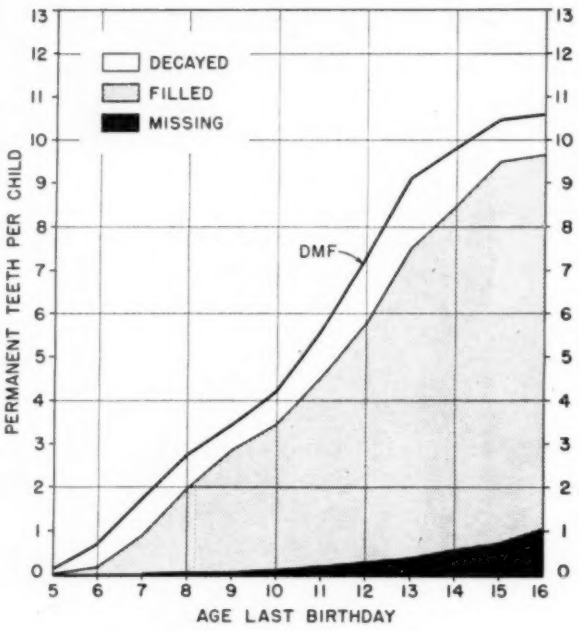


Figure 2. Dental caries prevalence in permanent teeth, 4th treatment series, Richmond, Ind., ages 5–16.



whereas in the first treatment series the highest average (5.11 carious teeth) was found in the 7-year-old group (see table 3).

Treatment Provided

Ninety-seven percent of the treated group received complete dental care during the third treatment series, and 54 percent of all children treated had 1 or more permanent teeth filled. One hundred and sixty-seven permanent teeth were extracted, or an average of 0.04 teeth per child for all age groups (see table 4). There were 7,795 permanent teeth filled, thereby restoring 11,143 surfaces. The age-specific filled tooth rates (table 4) exceed in most instances the age-specific caries rates for corresponding ages (table 3). This difference reflects the practice of prophylactic odontotomy in selected cases.

Since many of the children were on maintenance care during this series, it was practical to provide an increased amount of reparative treatment for the primary teeth. This included filling 3,631 primary teeth and restoring 6,493 surfaces. There were 2,016 extractions of primary teeth.

A total of 227 pulps were capped, and 31 vital partial pulpectomies were performed on permanent and primary teeth.

Topical fluoride applications were given to 2,099 children in this series.

Dentist Man-Hours

An average of 3.9 dentists were on duty during the third treatment series, or a ratio of 1 dentist to 1,009 children treated a year. As the report on the first and second series indicated (*1*), the dentist-staffing average was based on a full 65-hour biweekly period for all dentists assigned to the project. No deductions were made for administrative work, vacations, illness, training, and so forth.

Dentist man-hour rates were determined from the total clinic time for all dentists during the 15 months of the third treatment series. The average number of dentist man-hours required to complete treatment of each child in the third treatment series was 1.17. In addition to miscellaneous treatment provided, an average of 1.48 permanent and 0.65 primary teeth were filled per dentist man-hour.

Fourth Treatment Series

Dental examinations were given in the fourth and final treatment series to 5,836 children, or 95 percent of all Richmond children in kindergarten through the 9th grade. A total of 4,963, or 85 percent of the group, elected to receive treatment in the school clinics (see table 1). This group included 859 children, largely in the kindergarten and 1st grade, who had not been enrolled in the Richmond schools during the third treatment series.

Caries Prevalence

Only 43 percent of the children had 1 or more decayed permanent teeth, as compared with 75 percent of the treated children in the first treatment series. There were 5,963 decayed permanent teeth, approximately 12,000 less than in the first treatment series even though nearly 400 more children were treated in the final series.

The average annual increment of new decayed permanent teeth between the last third and fourth treatment rounds was 1.01 teeth per child.

Table 3. Dental caries prevalence in primary teeth of children, 3d and 4th treatment series, Richmond, Ind.

Age last birthday	Number of teeth per child			
	Carious	Filled	Carious and/or filled	Extractions indicated [1]
3d treatment series				
5–16 [2]	1. 54	1. 07	2. 45	0. 26
5	4. 86	. 58	5. 29	. 55
6	3. 79	2. 09	5. 53	. 48
7	2. 86	2. 81	5. 24	. 43
8	2. 28	3. 07	4. 95	. 47
9	2. 04	2. 14	3. 88	. 50
10	1. 43	1. 32	2. 54	. 33
11	. 84	. 64	1. 33	. 26
12	. 31	. 17	. 46	. 07
13	. 07	. 03	. 09	. 01
14	. 02	. 01	. 03	. 01
15	. 02	. 00	. 02	. 00
16	. 00	. 00	. 00	. 00
4th treatment series				
5–16 [2]	1. 27	1. 25	2. 37	0. 18
5	4. 55	. 76	5. 15	. 55
6	3. 10	2. 51	5. 32	. 34
7	2. 15	3. 28	5. 08	. 28
8	1. 71	3. 24	4. 61	. 30
9	1. 56	2. 71	3. 96	. 27
10	1. 17	1. 50	2. 45	. 23
11	. 65	. 68	1. 22	. 13
12	. 21	. 27	. 44	. 03
13	. 10	. 05	. 14	. 03
14	. 03	. 03	. 06	. 00
15	. 00	. 01	. 01	. 00
16	. 00	. 00	. 00	. 00

[1] Also included in "Carious."
[2] Average of the rates for ages 5–16.

The average number of carious permanent teeth for all age groups (5–16 years) is now 1.32 teeth per child, as compared with an average of 5.08 teeth per child at the beginning of the study project. There existed an average of 0.47 less DMF teeth per child in the fourth round of treatment than in the first. Only 99 teeth, or an average of 0.02 per child, were indicated for extraction in the final series, as compared with 815 teeth, an average of 0.24 per child, in the first series. Approximately 65 percent of the children examined had at least 1 filled permanent tooth, compared with only 17 percent at the beginning of the first series (see table 2 and figure 2).

In the first series, 5-year-olds, newcomers to

the clinic program, had 0.31 carious permanent teeth and no filled teeth. Four years later, when they were 9 years old, many of these children were included in the group reexamined before the beginning of the fourth treatment series. At that time, they had 0.87 carious permanent teeth, 2.83 filled teeth, and 0.05 missing teeth—one-fourth as many carious, 7 times as many filled, and one-third as many missing permanent teeth as the 9-year-olds in the first treatment series.

Thirteen-year-olds examined in the first treatment series had 7.41 carious permanent teeth, 1.46 filled, and 1 missing. Those who were 13 at the time of the fourth treatment series, many of whom from the time they were 9 had had the benefit of 4 years of clinic care, had 2.39 carious, 7.12 filled, and 0.39 missing permanent teeth—one-third as many carious, nearly 5 times as many filled, and only two-fifths as many missing teeth as their counterparts in the initial baseline examination.

Inasmuch as caries of the primary teeth begins to accumulate before the majority of the kindergarten and 1st grade children entered the clinic program, a lifetime accumulation of dental defects in this dentition was in need of repair. Some reduction of the prevalence of carious primary teeth was prevented, however, because the age (5 years) at which children were available for clinic care precluded restorative treatment to the 4 incisor teeth.

In the final treatment series, the highest prevalence rate of carious teeth was in the

Table 4. Dental treatment to permanent and primary teeth of children, 3d and 4th treatment series, Richmond, Ind.

Age last birthday	Number of teeth per child					
	Permanent teeth			Primary teeth		
	Filled	Filled surfaces	Extracted	Filled	Filled surfaces	Extracted
3d treatment series						
5–16 [1]	1.71	2.42	0.04	0.58	1.03	0.33
5	.18	.24	.00	2.91	5.37	.58
6	.78	1.09	.01	1.96	3.47	.58
7	1.30	1.90	.01	1.28	2.25	.55
8	1.27	1.96	.01	.55	.98	.58
9	1.27	1.92	.03	.14	.19	.60
10	1.51	2.16	.06	.05	.08	.43
11	2.09	2.95	.06	.02	.03	.37
12	2.64	3.60	.06	.01	.02	.15
13	2.73	3.76	.04	.01	.01	.05
14	2.82	4.04	.10	.01	.02	.03
15	2.58	3.66	.10	.00	.00	.04
16	1.35	1.79	.03	.00	.00	.00
4th treatment series						
5–16 [1]	1.36	1.94	0.02	0.45	0.77	0.22
5	.17	.22	.00	2.41	4.45	.52
6	.63	.83	.01	1.43	2.45	.39
7	1.01	1.40	.00	.96	1.63	.35
8	1.06	1.59	.02	.33	.55	.32
9	.88	1.23	.02	.06	.10	.35
10	1.08	1.55	.02	.01	.01	.33
11	1.46	2.01	.04	.00	.00	.17
12	2.06	2.84	.04	.00	.00	.08
13	2.43	3.50	.04	.00	.01	.06
14	2.08	3.22	.05	.00	.00	.02
15	1.61	2.35	.02	.01	.01	.00
16	1.82	2.59	.00	.00	.00	.00

[1] Average of the rates for ages 5–16.

5-year-old group (4.55 per child). For each age, beginning with 6, the number of carious primary teeth per child showed steady decrease with each successive treatment series, whereas the number of filled teeth per child increased in each successive series. By and large, a similar inverse relationship is true between teeth indicated for extraction and filled teeth.

The average number of decayed primary teeth in the age 7 group was 2.15 in the final treatment series, compared with 5.11 in the first series (see table 3).

Approximately 19 percent of the primary teeth examined were found to be carious. Thirty-four percent were found carious in the initial treatment series. Forty-three percent of the children now had 1 or more filled teeth, compared with 9 percent at the beginning of the first series.

Treatment Provided

Ninety-nine percent of the treated children received complete treatment during the final treatment series. A total of 6,112 permanent teeth were filled, thereby restoring 8,700 surfaces. Forty-four percent of the children had 1 or more teeth filled, as compared with 70 percent in the first series. Prophylactic odontotomy in selected cases probably accounts for the fact that the average age-specific rates of teeth filled per child in the fourth series exceed the carious tooth rates per child. The average number of surfaces restored per child in the final series is 1.94 compared with 6.65 in the initial series. There were 105 permanent teeth extracted, or an average of 0.02 per child, as compared with 0.24 during the initial series (see table 4).

In the fourth treatment series, 2,638 primary teeth were filled, and 4,534 surfaces were restored. An average of 0.22 teeth per child in all age groups or 1,323 teeth were extracted.

There were 231 pulps capped; and 34 vital partial pulpectomies were performed on permanent and primary teeth. During the final series, 1,358 children were given 4 applications of sodium fluoride.

Dentist Man-Hours

The final series required 11 months to complete treatment for approximately 4,950 children. An average of 4.05 dentists were on duty, or a ratio of 1,343 children were treated per dentist per year. During the initial series, an average of 4.3 dentists required 24 months to complete treatment for 4,057 children; each dentist treated an average of 530 children a year.

Table 5. Selected comparative data for the 4 treatment series, Richmond, Ind.

Comparative data	Treatment series			
	1st	2d	3d	4th
Clinic patients	4, 569	4, 797	4, 929	4, 963
Prevalence data (per child, aged 5–16):				
Carious permanent teeth	5. 08	2. 87	1. 63	1. 32
Filled permanent teeth	. 83	3. 32	4. 01	4. 28
Man-hours per year:				
Children treated per dentist	530	743	1, 009	1, 343
Dentist man-hours per child	2. 88	1. 86	1. 17	. 75
Treatment (per child, aged 5–16):				
Permanent teeth filled	4. 20	2. 83	1. 71	1. 36
Permanent teeth extracted	. 24	. 05	. 04	. 02

Dentist man-hour rates were determined from the total clinic time for all dentists during the 11 months of the fourth treatment series. An average of 0.75 of a dentist man-hour was required for each patient completing treatment in the final series, whereas 2.88 dentist man-hours were required for each patient in the initial series. Teeth were filled at an average rate of 1.75 permanent and 0.75 primary teeth per dentist man-hour.

Summary of All Four Series

An average of 4,800 school children, kindergarten through the 9th grade, were given complete dental treatment in each of 4 treatment series in the Richmond dental care project. These constituted about 85 percent of the children enrolled in the Richmond schools. Another 6 percent of all children in the Richmond schools had regular dental care from their own dentists. Seven percent sought no care at all.

Examination during the first treatment

series showed an average of 0.83 filled permanent teeth for children aged 5–16. During the fourth series, the corresponding rate was 5 times as high, or 4.28 per child. Similar comparison for total missing teeth shows an average per child of 0.61 in the first series and 0.29 in the fourth—a reduction of more than half.

In the first treatment series, 6.65 permanent tooth surfaces per child were filled. In the final series, the number of surfaces requiring fillings was only 1.94, or three-tenths as many as in the first.

Even with the minimal amount of care given to primary teeth, the filled tooth rate per child increased from an average of 0.22 teeth per child, aged 5–16, in the first treatment series to 1.25 per child in the fourth treatment series, or more than a fivefold increase.

In the first treatment series, each dentist was able to care for 530 children during the course of a year. At the time of the fourth round of clinic care, dental needs had been reduced to the point where 1,343 children a year were cared for by 1 dentist. Thus, while an average of 2.88 man-hours of treatment for each child was required in the first treatment series, only 0.75 of a man-hour was needed in the fourth. This includes the time required to treat 859 children who had not been treated previously (see table 5).

With the exception of new patients, permanent teeth required only maintenance care during the last three treatment series. The influence this exerts on the average time required to complete treatment for each child is evident from the fact that an average of 2.88 dental man-hours were required to complete treatment during the initial round (when most of the children had a lifetime accumulation of dental defects), as compared with an average of 0.75 of a dental man-hour in the final round of treatment.

Using approximately the same personnel ratio, the number of months to complete each treatment series was 24, 20, 15, and 11, respectively. Naturally, there was an overlap between treatment series when treatment was being provided in two treatment series simultaneously.

The total elapsed time to complete the 4 treatment series was 5 years.

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Institutes on the Care of Premature Infants

Institutes are being held for physicians and nurses on the care of premature infants at the New York Hospital-Cornell Medical Center. The institutes, now in their fifth year, are sponsored by the New York State Department of Health and the United States Children's Bureau. Physicians and nurses in charge of premature nurseries in hospitals and special premature centers and medical and nursing directors and consultants in State and local programs are invited to attend.

The attendance at each institute is limited to six physician-nurse teams. The program for physicians is for 2 weeks and for nurses it is 4 weeks. Participants pay no tuition fee and stipends are provided to help cover expenses during attendance at the institute.

The last institute for the current fiscal year starts on May 17, 1954. Five institutes will be held between September 1954 and May 1955. Additional information may be obtained by writing Box 143, Institute in the Care of Premature Infants, The New York Hospital, 525 East 68th Street, New York 21, N. Y.

Radium in the Healing Arts and in Industry

By JAMES G. TERRILL, JR., C.E., M.B., SAMUEL C. INGRAHAM II, M.D., M.P.H., and DADE W. MOELLER, M.S.

Radium is a naturally occurring radioactive element, widely distributed in minute but measurable concentrations throughout the world. For example, a gram of typical granite contains about 10^{-12} gm., or 10^{-12} curie, of radium (in popular usage, 1 curie of radium is 1 gram). Ocean bottom sediments may contain as much as 22×10^{-12} gm. of radium per 1-gm. sample (*1*). The incrustations around certain natural springs may contain many times these amounts. At Saratoga Springs, N. Y., one deposit has been found to contain 769×10^{-12} gm. of radium per gram of solid (*1*). The waters from these springs are radioactive. Mammoth Hot Springs in Yellowstone National Park, Wyo., contains $1{,}440\times10^{-12}$ gm. of radium (radium-equivalent) per liter; Curie Spring at Boulder, Colo., contains $267{,}800\times10^{-12}$ gm. of radium (radium-equivalent) per liter.

Some 4.5×10^{-17} percent by weight of natural dry air is the radioactive gas radon, the first decay product of radium. This is a minute concentration, but the air in many of the radium-bearing mines in the western section of the United States contains appreciably heavier concentrations of radon.

Radium can be a public health problem both as it exists in nature and after it has been refined or concentrated. Refined radium has found widespread use in medicine and industry. Applications include the use of radium in medical therapy, industrial radiography, and luminous compounds. Reviewed here are some of the aspects of the public health problems associated with radium. These data supplement earlier presentations by the authors on the principal sources of radiation exposure in the United States (*2*, *3*).

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Health Hazards

Radium can be a source of internal or external exposure.

Internal Exposure

Internal exposure can occur as a result of ingestion of radium-containing substances or as a result of inhalation of radium particles or dust, the latter being more hazardous than the former. Approximately 100 microcuries (100 micrograms) administered orally or 20 microcuries intravenously or by inhalation would deposit about 1 microcurie of "fixed" radium in the body. The classic method for calculating the amount of radium in the body is based on determinations of the radon content of the air expired by the individual. A radon concentration of 1 micromicrocurie per liter of expired air is considered to correspond to a body content of about 0.1 microcurie of radium (*4*).

Body tolerances to radium vary widely. Generally, 1 to 10 microcuries of radium fixed in the skeleton will cause chronic radium poisoning; 10 to 100 microcuries will cause acute poisoning (*5*). However, fatal cases have been observed

in which the radium burden of the body was as small as 1 microcurie (*6*).

The International Commission on Radiological Protection has accepted certain health standards for radium. For occupational workers, the maximum permissible amount fixed in the body is 0.1 microcurie. For radium appearing in the atmosphere as a soluble aerosol, the maximum permissible concentration is 8×10^{-12} microcurie per milliliter. The maximum permissible concentration for radium in drinking water is 4×10^{-8} microcurie per milliliter (*7*).

Radium compounds and products containing radium are all sources of radon. If inhaled or ingested, this gas is also a source of internal exposure. The generally maximum permissible concentration for radon in the air is 10 micromicrocuries per liter (10^{-8} microcuries per milliliter) (*4*).

External Exposure

External exposure may occur as a result of the beta and gamma radiations emitted by radium and its decay products. The alpha radiation of the energy emitted does not penetrate the normal (intact) skin and constitutes no external hazard. The beta and the gamma radiations, however, can penetrate the skin and are therefore externally hazardous. The maximum permissible weekly whole body exposure for occupational workers is 0.3 roentgen measured in air. The roentgen is the unit for measuring radiation absorption. (The milliroentgen is one one-thousandth of a roentgen.)

Radioactive Nostrums

Radium-bearing spring waters have been advertised for many years for their curative properties. Recently, advertisements of several radium-uranium-bearing mines in the western portion of the United States have implied relief or cure of a host of chronic diseases.

The curative claims for radioactive spring waters were investigated exhaustively during the 1920's and early 1930's. The medical and biological literature of that time is replete with articles on the effects of radioactive substances both in disease treatment (particularly of the chronic diseases) and in the healthy human body.

The early reports praised the medical effects of bathing in, ingestion of, and injection of radioactive materials. It may be inferred today, however, that the beneficial effects of such treatment, if any, were produced by psychosomatic processes. As experience was gained, evidence accumulated of delayed injuries and deaths from medically potent quantities of radioactive substances retained in the body (*8*). The consequent advice against indiscriminate use of radium, radon, and other radioactive medicaments applies not only to radioactive springs and radioactive mines but also to injections and oral dosage.

Pending the growth of understanding and precise evaluation of the probable hazards and benefits, current, approved medical practice is to use radioactive materials only under carefully controlled conditions, such as are found in a radiological clinic or radiologist's office. It is accepted that even such benefits as occur from the physical effects of radium are a result of the destruction of living tissues. The health profession believes that unnecessary exposure to the radioactivity in spring waters or in mines presents a needless radiation hazard to health.

Refined Radium

The entire world supply of refined radium amounts to about 5 pounds (approximately 2,500 gm. or 2,500 curies). It has been estimated that the amount in medical and industrial use in the United States is about 1,000 curies. Refined radium can be purchased on the open market. No formal application or special facilities are required for obtaining this material.

Radium, as normally used in medical therapy and industrial radiography, is enclosed in a capsule of platinum or silver approximately 0.5 mm. thick. The capsule acts as a container for the radon produced as well as an absorber for the alpha and beta radiations. The 0.5-mm. thickness of platinum or silver is sufficient to filter out all the alpha and beta radiations. The gamma radiation from 1 curie of radium, in equilibrium with its decay products and so enclosed, produces an exposure rate of approximately 9 roentgens per hour at a distance of 1 foot. If the radium is in a small capsule and

if one considers only distances great in comparison to the size of the capsule, the radium, for practical purposes, represents a point source, and roentgen dosages at other distances can be calculated by the inverse square law. (Dosage is inversely proportional to the square of the distance.)

Medical Therapy

More than 80,000 radium treatments are given annually in the hospitals in the United States. A medium-sized modern hospital usually has about 300 millicuries (300 mg.) of radium on hand for this purpose. Practicing physicians using radium will often have 25 to 50 millicuries, and nearly every dermatologist has 10 millicuries or more on hand.

Sealed sources of radium are used for both external and internal therapy. External therapy (the source of radiation being outside the body) is accomplished by means of radium "packs," plaques, and moulages, molds for accurately positioning the source of radiation (contact therapy) and by radium "bombs" (teletherapy). Internal therapy is accomplished by inserting radium needles or radon seeds directly into diseased tissues (interstitial) or into body cavities (intracavitary) (*9*). Internal therapy probably represents the more common medical use of radium today.

Unsealed sources (radon ointments) are also in use but are still in the process of medical evaluation. Formerly, radium was administered by mouth and by vein for the treatment of certain diseases, but, as pointed out earlier, this use of radium has been abandoned as ineffective and dangerous.

Exposure of Patients

The usual medical patient undergoing radium therapy will receive large doses of radiation to selected limited portions of his body. These exposures are planned, controlled exposures to relieve disease conditions. Although they may injure nondiseased tissues also, they are administered for the net medical benefit of the patient. The net possible gain to the patient's health is assumed to justify the calculated risk of controlled exposure.

When radium is used externally, it may be compared somewhat to supervoltage X-ray. Dosages are similar (approximately 6,000 to 7,000 roentgens), but the radium sources commonly used normally require much more time than does X-ray to give doses of this magnitude.

Internal therapy dosages range from 1,000 to 10,000 roentgens. For example, the dose for cancer of the uterine cervix is approximately 4,000 roentgens. In any volume of tissue implanted with radon seeds or radium needles, the intensity distribution of the radiation varies considerably. Directly at the surface of the needle the dose rate is high, but it falls off rapidly at distances of a few millimeters. Since it is usually desired to eradicate all cells in the particular tissue being irradiated, the cells receiving the minimum dose constitute the critical therapy areas. Radiation exposures must be such as to insure a lethal dose to these cells (*9*).

Utmost care should be exercised in the medical use of radium to prevent unnecessary injury to the patient. Such injury can result through the introduction of radon-leaking radium needles into the patient or the application of superficial radium sources with improper filtration (*4*).

Exposure of Other Persons

In the medical use of radium (or radon), nurses, technicians, therapists, radiologists, stenographers, and other persons (including other patients) who are in the vicinity of the radiation source or the patient are potentially exposed. These exposures may occur as a result of improper storage of the radiation source; during preparation of the source for therapy; during the application, insertion, or removal of the source from the patient; and during the period the patient is actually being treated.

In a survey of hospitals reported upon in 1941, Cowie and Scheele (*10*) found that improper storage of radium was common. Stenographers often worked within 5 to 6 feet of such sources.

The assembly or preparation of applicators is a task often assigned to residents, interns, technicians, and nurses. Cowie and Scheele

(*10*) found that these people frequently had little knowledge of the dangers of the overexposure and occasionally had too little direct supervision. Measurements of the exposures received in selected cases during assembly of tandems under varying circumstances for intrauterine insertion showed body exposures ranging from 0.02 to 0.08 roentgen and exposures to the fingers reaching as high as 36 roentgens.

Technicians and therapists often receive exposures since radium seldom can be applied to the patient with accuracy, using remote handling devices. Local exposure to the hands in many cases exceeds 1 roentgen per day. This work should be rotated among qualified persons to reduce cumulative exposures of individual workers.

Nonpatient exposures in the United States are probably of the same order of magnitude as those reported in England. Parker (*4*) reports that the average daily exposure received by radium therapists in a typical teleradium installation in England in 1940 was between 0.13 and 0.25 roentgen. He also reports that the common practice in radium institutions has resulted in daily general body exposures of about 0.14 roentgen. It is important to note, however, that these exposures were obtained under conditions in which 0.2 roentgen per day was accepted as the maximum permissible exposure. More recent data tend to indicate lower exposures. Howarth and associates (*11*) report that the total body exposure for one radiologist routinely using radium in England was less than 0.01 roentgen (10 milliroentgens) per day. However, radiation received by the hands was approximately 0.15 roentgen per day and that of the fingers even higher.

Medical personnel and others can be exposed also after the radium has been applied to the patient. Therefore, it may be advisable to have patients undergoing treatment located in separate rooms or at least at a safe distance from other patients and in areas not frequented by medical and other personnel.

Industrial Radiography

Radium is used in industrial radiography for the nondestructive inspection of castings and weld products. In 1948, approximately 50 gm. (50 curies) were being used for this purpose in the United States. During World War II, this figure reached 100 gm. (*12*) largely because X-ray units were difficult to obtain. At present, much of the radium radiographic work done during the war has been discontinued, and either X-ray machines or cobalt-60 is used instead.

As a general practice, industrial concerns using radium for radiography rent their sources from commercial suppliers. From 80 to 90 percent of the industrial users follow this practice, whereas 90 percent of the medical users own their own sources (*12*). The industrial radioactive source is usually radium sulfate in a hermetically sealed silver capsule. This is supplied to the user in a steel or aluminum cartridge similar in appearance to a plumb bob. Radium sources are available in 25-, 50-, 100-, 200-, 300-, and 500-mg. units. The 100- and 200-mg. sources are used most commonly (*12*).

The fact that radium sources are small and portable accentuates the necessity for careful control of the source as a protection to persons uninformed of the health hazards associated with exposure to ionizing radiations. According to Williams (*12*): "The greatest problem in handling radium for industrial uses, based on our experience, comes from handling of the source by unauthorized persons. There have been several cases reported where a radium source has been handled by persons ignorant of its nature with resulting burns. Any user of radium should exercise extraordinary precautions to control it at all times."

Since the radium salt is sealed in a relatively thick metal capsule, gamma rays constitute the only radiation from the source. The major exposure to operators comes from handling the source during preparation for the photograph and returning it to its lead-shielded container after completion of the photograph (*12*). In some instances—where the source must be transported through ship double-bottoms, for example—overexposure seems unavoidable. Rotation of personnel and monitoring are indicated in these instances.

Many of the known overexposures in industry have resulted from improper indoctrination and supervision of personnel. Uninstructed

workers tend to linger in areas of relatively high exposure because of ignorance about radiation health hazards and inadequate monitoring data. One relatively common error in industrial radiographic technique is the use of an actual radiation source in a trial, or "dummy" run, when a replica of the source would serve the purpose.

The trend in industry is toward larger radium sources. As a result, the areas used for industrial radiography in many industries are often inadequately shielded for the size of the source being used. Furthermore, radiographic areas are often placed adjacent to the radiographic darkrooms, offices, and washrooms, which should be free of radiation exposure.

Other hazards associated with the use of sealed sources of radium, in either medical therapy or radiography, are: (*a*) possibility of dropping, stepping on, or otherwise breaking the seal with resulting scattering of radium about an area and into the ventilation system (*13*), and (*b*) exposure to radon gas when initially opening the lead-shielded container of a source which has a break in its seal and has not been used for some time.

Luminous Compounds

Another important industrial use of radium is in luminous compounds. These substances, also known as luminous materials or radium paints, are a mixture of phosphorescent zinc sulfide and radium (not to be confused with nonradioactive fluorescent pigments which glow only under stimulus of light), mesothorium, and other similar radioactive substances. The material is usually packed in small glass bottles holding 1 gm. of the mixture. It is used to make markings that are visible in the dark by virtue of the light emitted by the zinc sulfide under bombardment from the radium. This compound is mixed with an adhesive to form a "paint" just before its actual application. The quantity of radium used is relatively small, ranging from 4 to 100 micrograms per gram of paint. The brightness required determines the amount of radium used (*12*).

During the 1940's, there were several thousand workers involved in the use of self-luminous paints in the United States (*12*). It is probable that a similar number of people are engaged in this work today.

Self-luminous instrument and watch dials are the main products of this industry, but hands and pointer also are painted. During World War II, such objects as vehicle markers (40 micrograms of radium per gram of paint), personnel markers (11 micrograms per gram), and luminous rope (5 micrograms per gram) were produced (*12*). Several hundred grams of radium were used in this industry during World War II.

Although individual workers handle relatively small quantities of radium at a time, the hazards to health from this use of radium are significantly greater because the radium is not sealed in a container, and, therefore, can be ingested or inhaled and retained in the body. The radium found in the bodies of workers actively engaged in this trade apparently consists of two fractions: a fixed fraction deposited in the bones, and a mobile fraction that is continually being excreted and replenished from recurrent contact with the radioactive luminous compound. When the workers are removed from their source of exposure, they usually excrete enough radium to lower the body content measurably.

Hazards of Compounds

Typical hazards associated with the handling of radium luminous compounds are: (*a*) ingestion or inhalation of solid radioactive luminous compounds; (*b*) inhalation of radon liberated from the compounds into the air; and (*c*) exposure of whole body to gamma radiation.

The first of these represents the greatest health hazard. Under the best working conditions existing in 1943 in the radium-dial-painting industry, about 15 percent of the workers accumulated more than 0.1 microcurie (the maximum permissible amount) of radium in their bodies (*4*). Substantially all dial painters, inspectors, and assemblers ingest or inhale a sizable fraction of the maximum permissible amount. In one survey it was reported that 30 percent of the workers employed for less than 1 year and 60 percent of all others showed radon breath samples above the maximum permissible level (*4*).

It has also been demonstrated that people

working in the vicinity of radium-dial painters may accumulate an appreciable fraction of the maximum permissible dose in the body, despite the fact that they never actually handle radioactive materials. Such exposure is due to airborne transport of dispersed radioactive particles, dusts, and/or gases.

Inhalation of radon liberated from the compound into the air is the next most important health hazard associated with luminous compounds. To meet the requirements of the standard for the maximum permissible concentration of radon in air (10 micromicrocuries per liter or 10^{-8} microcuries per cubic centimeter), both workrooms and rooms in which the painted products are stored must be ventilated properly.

Evans (*5*) has pointed out that in the absence of ventilation, the storage of a few thousand dials in a moderate-sized room can raise the value of the radon concentration in the air to more than maximum permissible concentration in less than 1 hour. The radon content of the air in properly ventilated workrooms is about 30 percent or less of the maximum permissible level (*5*).

Willard (*14*) has reported findings in a plant using the screen (stencil type) method of radium-dial painting. The concentration of radon in the workroom air was almost 200 percent of the accepted maximum permissible limit.

In dial painting and storage, the gamma radiation hazard should be slight. However, values as high as 0.05 to 0.10 roentgen per day have been observed in dial-painting plants where inadequate attention is paid to preventing the accumulation of paint supplies and finished work. In addition, in some plants gamma radiation hazards may arise from radium compound spilled on the floor, in cracks, in corners, and around pipes (*5*).

To protect dial painters, maximum amounts of radium luminous compound permitted in each painter's booth have been set. These are aimed at a radiation dosage of less than 0.02 roentgen per day for each worker. However, the usual exposure appears to be about 0.02 roentgen per day (*4*).

In considering internal and external exposure, it is important to recognize that the two are additive. To estimate total dosage the external exposure of the whole body to gamma radiation from radium must be added to the internal exposure to the body tissues received by workers who have inhaled or ingested radium or radium compounds. For example, if an individual worker receives the maximum permissible external exposure and, in addition, has inhaled or ingested the maximum permissible concentration, his total exposure is twice the maximum permissible. The additive nature of external and internal exposures is further justification for limiting the quantity of radium handled by the individual worker and for insisting on adequate ventilation of the working space.

Hazards of Finished Products

Exposures may also occur in the use of the finished product to which a luminous compound has been added. A watch may have approximately 1 microgram of radium on it, and some clocks and aircraft instruments may contain from 10 to 100 micrograms. Evans (*15*) measured the gamma-radiation intensity in the cockpits of several large passenger airplanes and found 10 milliroentgens per hour at the gyro (compass) and generally over the surface of the entire instrument panel, 5 milliroentgens per hour at the pilot's ankles, 2 milliroentgens per hour at the pilot's elbow, and 1 milliroentgen per hour at the back of the pilot's seat, due to radium paint on the instruments.

Other Sources of Exposure

Exposure to radium and its decay products occurs in mining uranium, radium, vanadium, and other radioactive ores. Several thousand miners and millers are engaged in uranium mining and milling, which is carried on primarily in the plateau region of Colorado. The Public Health Service and several State health agencies active in studies of the specific hazards in this industry have reported finding radon exposures above the maximum permissible concentration in several of the mines. In these instances, control measures, particularly ventilation, are being applied as rapidly as possible. Detailed physical examinations of more than 1,100 workers are reported as re-

vealing no evidence of health damage from radioactivity.

The operation of radon plants, commercially or in hospitals, can be hazardous to health since the worker may be exposed not only to radon but also to the alpha, beta, and gamma radiations of the radium and its other decay products. Both internal and external exposure hazards are present in a radon plant.

Exposures occur in industries which reprocess used radium sources or recover radium from used equipment. This reprocessing, performed by relatively few companies, involves hazards similar to those met in the operation of a radon plant. A radon concentration of 220 times the maximum permissible has been quoted as average for the air in the general laboratory of one of these companies (*4*).

There are also exposures in industries which use radium in the manufacture of static eliminators, electronic tubes, and radium and neutron sources. In general, published data on the numbers and exposures of personnel working in these industries are limited. Data on exposures resulting from the use of static eliminators, however, are available. A summary of these data are presented in the report entitled "Radiation Exposure in the United States—Static Eliminators," available from the radiological health branch, Bureau of State Services, Public Health Service.

Exposure can occur during the handling and shipping of radium. Excluding the radon hazard which exists if the radium is unsealed, these health hazards are similar to those encountered with other beta- and gamma-emitting radioactive isotopes (*3*).

Numerous instances of radium being lost have been reported. Taft (*16*) has reported on 107 losses, 59 of which were recovered completely, 11 partially recovered, 36 completely lost, and 1 not recorded. There is danger of radiation exposure in all such occurrences.

Summary

Radium, a radioactive element, can be a health problem as it is found in nature, as it is processed, or as it is used in its refined state. Although the health problems of radium were recognized somewhat tardily, experience with radium has contributed much to modern radiological health protection programs.

Today, exposure to radium sources potentially affects many individuals. In medicine, in addition to the patients undergoing treatment, these individuals include nurses, technicians, therapists, radiologists, dermatologists, and others who handle or prepare radium. Stenographers and other persons who work in the vicinity of the radiation source or patients being treated are also possibly subject to chronic exposure.

Industry was using 50 curies of radium in radiography in 1948. Several hundred curies were utilized in the luminous compound industry during World War II. Exposures to radium occur also in the mining and processing of radioactive ores; in the manufacture of items containing radium such as static eliminators, electronic tubes, and radium and neutron sources; and in industries which reprocess used radium sources or recover radium from used equipment. Radium losses and spills, which occur despite the most conscientious handling, produce other sources of exposure. Additional, but needless, exposures occur in the use of radium-bearing mines and springs for alleged "medical treatments."

Radium can be purchased on the open market. No formal application or special facilities are required. Currently, a total of about 1,000 curies are in medical and industrial use in the United States.

Sound radiological practice suggests that official health agencies should learn where radium sources are used in their communities and should assure themselves that proper precautionary measures are maintained.

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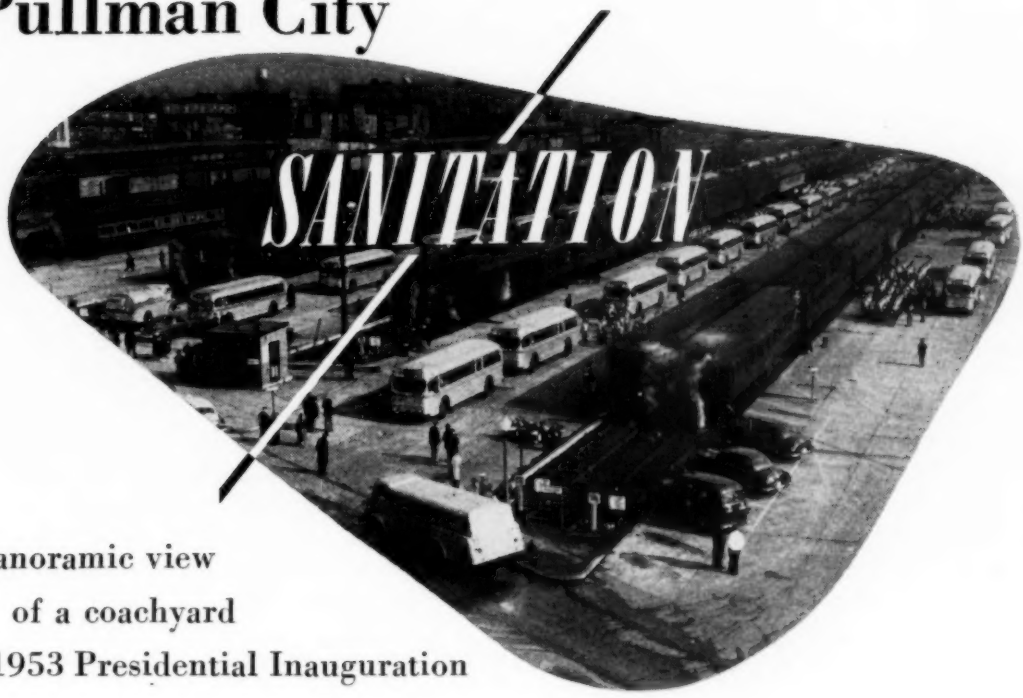
Radioactive Steroids Available to Researchers

Qualified investigators may obtain free of charge limited supplies of radioactive steroids by addressing their requests in the form of a letter concisely describing the proposed research to the Endocrinology Study Section, Division of Research Grants, National Institutes of Health, Public Health Service, Bethesda 14, Md.

Available are cortisone acetate (compound E), hydrocortisone (compound F), corticosterone (compound B), and five other radioactive steroids which were obtained as intermediates in the synthesis of the cortisone acetate. These compounds are all labeled at position 4 with C^{14} and have a specific activity of 0.49 mc./m. mole, except the corticosterone, which has a specific activity of 1.47 mc./m. mole.

Transfer and use of these materials are subject to current Atomic Energy Commission regulations. The compounds are made available through funds supplied by the Public Health Service's National Institute of Arthritis and Metabolic Diseases. Synthesis of these ring-labeled compounds was an international effort, in which several commercial laboratories and members of the Endocrinology Study Section have participated. The above-named radioactive steroids have already been distributed by the study section to 24 laboratories, 2 of which are in England. Many of the investigators using these materials are leaders in the field of medical research, particularly endocrinological medical research.

Pullman City SANITATION



Panoramic view
of a coachyard
at the 1953 Presidential Inauguration

By RICHARD P. LONG, B.S., and GILBERT V. LEVIN, B.E., M.S.

FOR THE HALF MILLION or more visitors to the Nation's Capital during the 1953 Presidential Inauguration, the period of January 18–22 was a gay holiday. But the unprecedented throngs resulted in a variety of sanitation problems not encountered in the everyday activities of the District of Columbia sanitation and health workers and Public Health Service personnel.

Mr. Long has been engineer in charge of interstate carrier sanitation in the Region III office of the Public Health Service since 1952. Previous sanitary engineering assignments have been in Regions VIII and VI. Mr. Levin is public health engineer of the bureau of public health engineering, District of Columbia Department of Public Health. Prior to 1951 he held sanitary engineering posts with the California and Maryland State Departments of Public Health.

Railroad officials estimate that some 100,000 persons came to Washington by train during the inaugural period. Of these, 7,780 were housed in "pullman cities" at 5 railroad sidings and coachyards within the District of Columbia, creating special sanitation problems. A total of 299 pullman cars was used as railroad hotels during the inaugural period.

Approximately 1 year prior to the inauguration, sanitation and health officials met with railroad officials to determine the scope of the sanitation problems created by the operation of the pullman cities and to develop plans for a safe water and ice supply; collection and disposal of soil-can wastes, garbage, and trash; and for dining car sanitation. Taking part in the discussions and planning were representatives of the District of Columbia Department of Sanitary Engineering, division of sanitation; the District of Columbia Health Department bureau of public health engineering and bureau of food inspection; the Public Health

Service; the Pennsylvania Railroad; and the Baltimore & Ohio Railroad.

At subsequent meetings, the entire pullman city sanitation problem was reviewed, current requirements were discussed, and methods of satisfactory compliance were outlined. The District of Columbia Health Department developed detailed procedures for taking care of known and anticipated sanitation problems at the pullman cities, including necessary preliminary preparation. Instructions were mimeographed and distributed to railroad officials and others concerned.

Special consideration was given to the care of potable water hauled with flusher-type tank trucks. The District of Columbia division of sanitation agreed to make seven flusher-type tank trucks available to the railroads for hauling potable water to equipment located in areas where water taps were not available or were inadequate; to collect garbage, free of trash, from the areas daily between 7 a. m. and 9 a. m.; and to have a public scavenger collect soil-can wastes on regular workdays between 7 a. m. and 6 p. m.

The railroads agreed to provide adequate storage facilities for trash at each parking area, using their equipment to collect and dispose of these wastes at the District's landfill. To insure adequate coverage, the railroads arranged with the public scavenger for special service after hours and on holidays.

Because of the interstate aspects, Public Health Service personnel from Region III were assigned the responsibility for railroad dining car and food sanitation associated with inaugural travel. Representatives of the Region III office maintained close contact with the railroad dining car officials for several weeks before the arrival of the first inauguration specials and assisted in the planning and development of an effective program of operation. Two Public Health Service vessel inspectors stationed at Baltimore were temporarily assigned to Washington to assist in inspection of dining cars.

Water Supply

In addition to the precautions for water care, outlined in the mimeographed instructions to the railroads, a dose of 1 p.p.m. of available chlorine was added to each flusher tank after it was loaded with city water so that a residual would be available during all operations. Temporary pipelines for watering cars were installed at the 14th Street and Jersey yards and were disinfected in accordance with instructions. Equipment at the Union Market, Benning, and Eckington yards was supplied with water by the street-flusher trucks.

To confirm the practice of good sanitation methods in supplying water by both means, 206 water samples were collected by the Bureau of Public Health Engineering during a 3-day period and were examined for coliform organisms and total bacteria by the Bureau of Laboratories. Public Health Service personnel conducted parallel tests in the coliform determinations with the newly developed membrane filter to test the usefulness of that method under emergency conditions. The membrane filter method reduces incubation time to 18 hours.

On-the-spot chlorine residual determinations were made at each point sampled. All bacteriological samples were divided and were examined in accordance with Standard Methods for the Examination of Water and Sewage as well as by the membrane filter method. The two methods produced excellent correlation of results.

In all, only three of the samples collected were positive for coliform organisms, and at least one of these was taken from an incoming train before fresh water was added. In each instance in which a positive sample was collected, the car tanks were thoroughly flushed and were refilled with water containing a chlorine residual.

Chlorine residual tests, made on the trains shortly after fresh water had been loaded, rarely showed any free or combined chlorine residual, despite the 1 p.p.m. dose applied to the flusher trucks. Apparently, the chlorine, readily detected in the flusher trucks in amounts of 0.3 p.p.m. or more, was consumed almost immediately upon being introduced into the railroad car water tanks. These tanks probably contained considerable amounts of material with a high chlorine demand.

Clear plastic bags or wrappings were placed over flusher outlets, connections, fittings, appurtenances, and hose ends to protect them from possible contamination.

Sewage, Garbage, and Refuse Disposal

At the various yards, railroad crews of from 6 to 9 men, each with a supervisor, tended the soil cans, which were to be placed under every hopper outlet as soon as a train arrived in a parking area. However, when long trains arrived, or several trains arrived at about the same time, there were not enough men to get all cans in place in time to prevent discharge from some of the car hoppers.

Full cans were taken out of service, replaced by clean cans, removed to one section of the yard, and covered with a tarpaulin, pending twice-daily scavenger collection. On each visit, the scavenger emptied the assembled cans, as well as those in service requiring attention. The large number of extra cans available, in addition to the number actually in use at any one time, reduced waste spillage considerably. In all, the railroads provided some 2,200 soil cans.

The principal cause of spillage or discharge of waste to the ground was not the fault of the operation, but a defect in the design of many of the old railroad cars used. Hopper discharge outlets located over wheel trucks or other obstructions resulted in poor alinement of the cans with the hopper outlets. In some instances, it was impossible to catch any of the discharge in the cans.

Of the two types of cans used, the angle-spout can was superior to the vertical type. The angle-spout can, when properly placed, was more adaptable to the servicing of relatively inaccessible hoppers. The smaller inlet and good fit to the hopper outlet reduced waste spillage and exposure.

The placing of soil cans so that the hopper outlet extended into the can was most important in preventing spillage and wind dispersion. When the soil cans could not be suspended from the car by hooks with the hopper outlet extending into the can, they were elevated on cinder blocks. Most of the waste spillage occurred when the cans were not placed high enough to cover the hopper outlet.

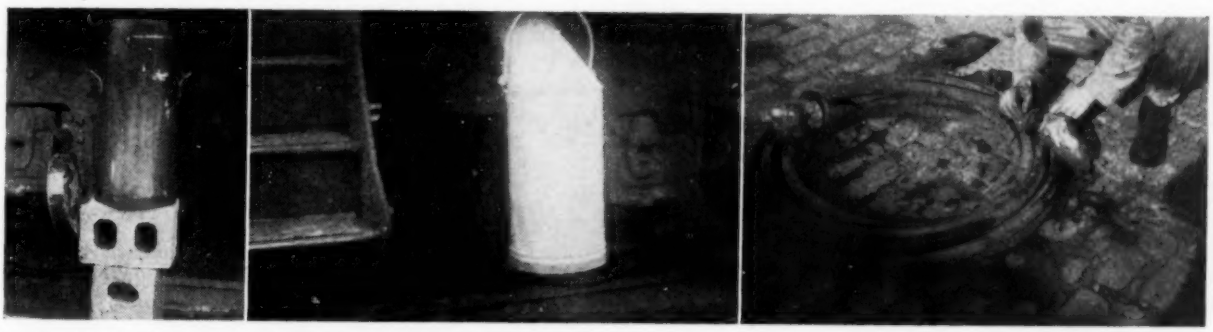
Spillage occurred rather frequently, but was attended to rapidly, and the yards were maintained in reasonably good condition. Lime was used liberally to cover all spilled waste.

Waste water from car lavatories was discharged to the track ballast. Because of food particles normally present in waste water from dining cars, this discharge was to be stored in containers for subsequent collection. However, the only receptacles provided by the railroads were regular soil cans which were inadequate in size. Thus spillage of waste water occurred at most diners.

Garbage and refuse were collected and disposed of as outlined in the instructions to the carriers, and the procedure appeared to be completely adequate. Refuse cans were placed at approximately 5-car intervals, and porters policed the cars and areas, collecting trash in burlap bags which they emptied into cans. Comparatively little trash and refuse were strewn about the yards.

Ice Supply

Probably the phase of sanitation leaving most to be desired in the entire pullman city operation was the care of ice. Very little of the ice was



Left: Vertical soil can, properly elevated on cinder blocks with hopper outlet extending into can. Center: Proper placement of angle-spout soil can. Right: Improper storage of hose on ground illustrates value of protective plastic bags on ends.

wrapped as directed, and none of the unwrapped ice was delivered in the sanitary fashion prescribed in the instructions. The ice was unloaded from open ice trucks to the floor of the railroad cars, and the porters rarely washed the ice before use. Although the bulk ice was supposedly for use in water coolers only, in innumerable instances the porters chopped off pieces of ice and placed them in the lavatories of the roomettes and other places for the passengers' use.

The ice for dining and kitchen cars was washed by dining car personnel prior to use, but here again, no arrangements were made to prevent or minimize contamination of the ice before placing it aboard the cars.

Dining Car and Food Sanitation

A total of 73 dining cars arrived in the Washington area on inaugural specials during the 3-day period, and 33 of the diners were set up and operated in the several pullman cities, serving 3 or more meals between the times of arrival and departure.

The Pennsylvania Railroad provided meals for 828 West Point cadets and 928 Coast Guard cadets in 17 dining cars at 2 freight yards and operated an additional 14 diners at 2 other yards.

In addition to operating 2 regular dining cars, the Baltimore & Ohio Railroad converted 2 baggage cars into kitchen cars, provided a refrigerator car for the storage of perishable food, and converted a freight warehouse into a temporary messhall seating 800 persons.

The kitchen car and temporary messhall setup provided meals for some 1,600 West Point cadets, 800 newsboys, and 125 Mount Lebanon, Pa., high school boys. Consultative service was provided Baltimore & Ohio dining car officials in the planning of this operation in order to obtain compliance with accepted sanitation standards.

Condensed Version of Advance Instructions to Railroads

Water

Flusher-type tank-trucks and appurtenances. Truck tanks, pumping equipment, hose, and fittings are to be given effective bactericidal treatment with a 100-p.p.m. chlorine solution, flushed twice through all outlets and refilled with fresh water not earlier than 1 day prior to use.

Temporary distribution systems and potable water hose. The locations of couplings on temporary hose distribution systems are to be staggered with respect to car toilet-hopper outlets to prevent contamination by splash and elevated at least 6 inches to minimize the possibility of contamination by pooled wastes. All temporary distribution systems are to be given effective bactericidal treatment with 100-p.p.m. chlorine solution discharged through all outlets, and flushed with fresh city water.

Sewage

An approved type of soil can is to be placed under each car's toilet-hopper outlet immediately after the car is located in the parking area. When possible, the soil cans are to be hung from the car, with the discharge pipe extending into the can to minimize splashing and wind dispersion. All other soil cans are to be replaced as needed and emptied at least twice daily by the District of Columbia contractor in accordance with railroad arrangements. Spillage and overflow of soil can waste are to be covered and thoroughly limed. Waste water from diners and buffet lounge cars are to be disposed of in a sanitary manner.

Garbage

Garbage, free of trash, is to be stored in covered metal containers and collected daily by the District of Columbia division of sanitation, in accordance with prior agreement.

Trash and Refuse

Fifty-gallon, metal drums are to be provided in all parking areas (1 drum for each 5 cars) for the storage of trash and refuse. Porters and railroad personnel will clean the cars and police the areas, placing all trash and refuse in the drums. Waste, collected by the railroads in their own equipment, is to be disposed of at the District of Columbia Kenilworth landfill.

Ice

Ice supplied to diners is to be sized and wrapped at the plant and delivered to the cars in such wrapping; unwrapped ice is to be washed and transported in clean, painted metal trucks or wheelbarrows, covered with clean canvas. The unwrapped ice is to be washed again aboard the diner before use.

The kitchen cars were equipped with gas ranges, stock pots, coffee urns, and similar equipment; and adequate sinks were provided for the dishwashing and bactericidal treatment tasks. A temporary waterline was connected to each car to provide ample running water, and a steam locomotive was connected to the cars to supply steam for hot water and heating. All waste water from the kitchen cars was piped to a nearby catch basin and was disposed of in a sanitary manner. Single-service paper plates and other items were used throughout, except for coffee cups and silverware, to reduce dishwashing.

The size of the workload made it impractical to conduct the usual comprehensive sanitation inspections of dining cars. Instead, frequent inspections were directed at major sanitation items, principally operation, to obtain on-the-spot corrective action of any deficiencies observed. Emphasis was placed on wholesomeness and preparation of all food; dishwashing and bactericidal treatment procedures; refrigeration; washing and handling of vegetables to be eaten raw; condition and maintenance of such equipment as cutting boards and utility knives used in food preparation; availability of toilet and handwashing facilities for food service personnel; and infections or lesions on the hands of foodhandlers.

The inspectors were assigned to specific areas of operation and were provided with the names of the railroad officials responsible for each parking area. Necessary corrective action was routed through District of Columbia inspection personnel when possible.

Observations indicated a general tendency toward the following violations during the early stages of operation:

1. Water used for bactericidal treatment was not maintained at 170° F. or more.
2. Washwater in sinks was not being changed frequently enough.
3. Careless handling of garbage and trash in some diners created a nuisance problem during the preparation and serving of meals.

On-the-spot correction of these practices, as well as of other miscellaneous violations, was obtained through the action of dining car supervisory personnel, and the several subsequent inspections of all diners indicated that the entire operation was well conducted.

Recommended Improvements

The operation of the pullman cities brought to light a few defects in sanitation which should be eliminated in a future operation.

The chlorine residual tests made on samples of the fresh water loaded on the trains showed that the addition of a 1 p.p.m. dose of chlorine to the city water was warranted. The dosage might even be increased to 1.5 or 2.0 p.p.m. in the future.

The use of plastic coverings was worthwhile in protecting the ends of water-handling equipment but some of the covers did not fit as snugly as they might. In a similar situation, the covers should be kept in place with some elastic material such as rubber bands. The plastic bags or wrappings should be of sturdy material, highly resistant to wear or abrasion.

At one yard, the Pennsylvania Railroad welded metal disks around the temporary pipeline couplings to elevate them above the ground. The disks were only 4 inches in diameter and were almost completely ineffectual. Disks at least 8 inches in diameter would be satisfactory.

Lime used to cover spilled wastes proved relatively satisfactory as a disinfectant. However, chlorinated lime would achieve better results and should be required for similar operations.

All waste water from dining cars should be piped to municipal sewers wherever facilities are available, since cans of adequate capacity can rarely be placed under the cars.

Delivery of ice in a sanitary condition was a major shortcoming. The suggested remedy to this situation would be better advance planning on the part of railroads, the provision of satisfactory ice-handling equipment at the site, and more general use of wrapped ice.

Discussion

The total public health personnel engaged in activities related to the pullman city phase of the inaugural sanitation program were 5 public health engineers and 7 inspectors. Two of the engineers and 4 of the inspectors were provided

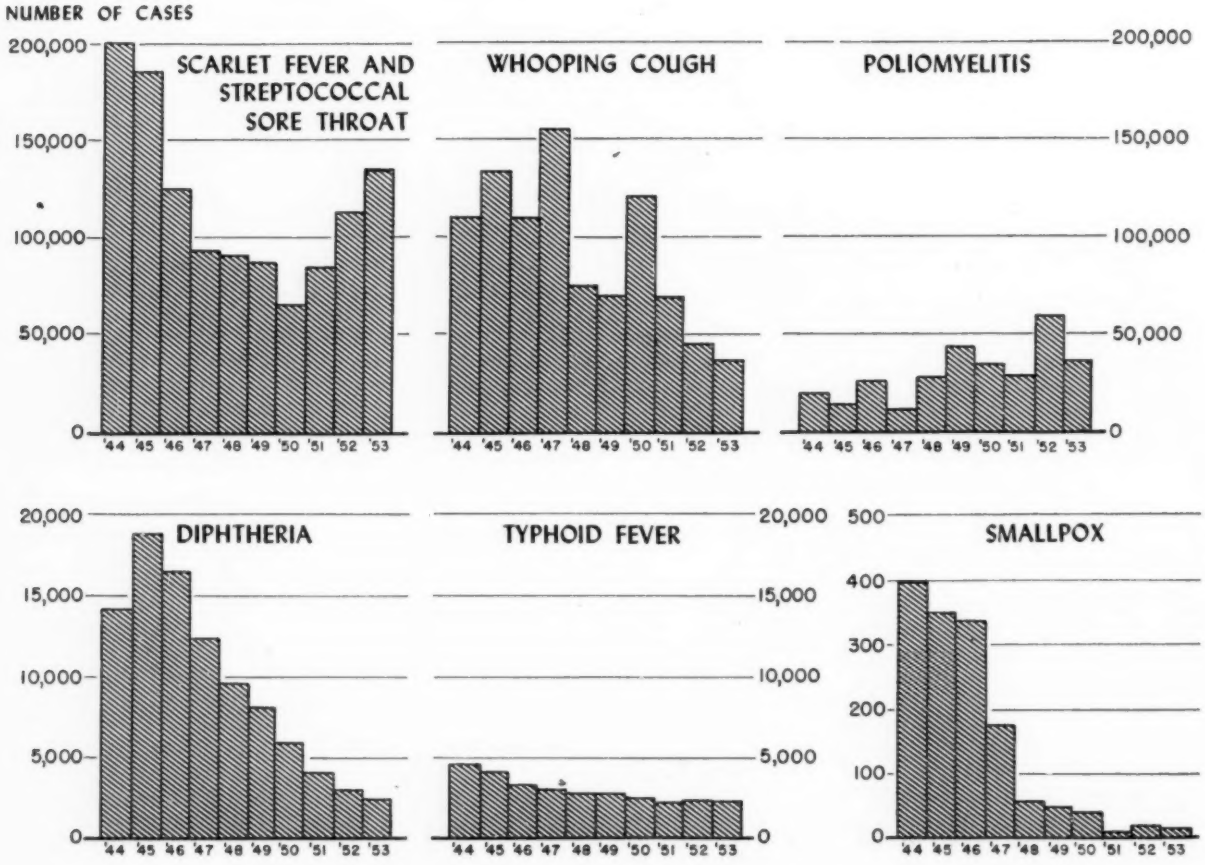
by the District of Columbia Health Department bureau of public health engineering, and 3 of the engineers and 3 of the inspectors were from the Public Health Service.

Cooperation among the many organizations actually doing the work was excellent. Although the railroads, their personnel, and facilities were taxed to the limit, supervisory and operating officials were most cooperative in correcting most deficiencies promptly upon being informed of them. The advance planning paid big dividends in pleasant working relationships and in keeping violations to a minimum.

The emergency housing methods and sanitary precautions described might be considered in civilian defense planning. With relatively few trained personnel, good temporary housing and all the concomitant needs were supplied for a sizable population. Railroad housing might provide the best solution in cities suffering from disasters, whether man-made or natural. As long as railroad tracks are serviceable, rolling stock could be made available to any large city in this country, on very short notice, to furnish shelter, food, water, and essential sanitary services to a large homeless population.

Trends

Reported cases of six notifiable diseases in the United States, 1944–53



NOTE: Charts are reprinted from the January 11, 1954, issue of *Morbidity and Mortality*, published weekly by the National Office of Vital Statistics, Public Health Service.

Uterine Cancer Morbidity Data

—*Memphis and Shelby County, Tenn., 1950–51*—

By JOHN E. DUNN, Jr., M.D., JOHN C. ROWAN, CYRUS C. ERICKSON, M.D., and EDWARD E. SIEGLER, M.D.

A COOPERATIVE PROJECT for screening the female population 20 years of age and over for uterine cancer by means of vaginal exfoliative cytology is being conducted in Memphis and Shelby County, Tenn. The project is based on an epidemiological and statistical method proposed by Dunn (*1*) for resolving the question as to whether carcinoma in situ of the cervix is usually a stage of invasive cervical cancer. The study is now in progress, and some of the preliminary findings have been reported (*2*, *3*).

One of the essential requirements for the method being used in the study is information on age-specific incidence rates for cervical carcinoma. The 1950 and 1951 cancer morbidity data for Memphis and Shelby County are presented in this report. The technique used for acquiring these data was the same previously used to obtain cancer morbidity data in a number of metropolitan areas in the United States and has been adequately described by Cutler (*4*).

Cooperating in this project are the Memphis and Shelby County Medical Society, the Bluff City Medical Society, the departments of pathology and of obstetrics and gynecology of the University of Tennessee Medical School, the Memphis and Shelby County Health Department, the local division of the American Cancer Society, and the Field Investigations and Demonstrations Branch of the National Cancer Institute.

Dr. Dunn directed the Field Investigations and Demonstrations Branch, National Cancer Institute, National Institutes of Health, Public Health Service, from 1948 to 1953. At present he is assigned to the California State Department of Public Health at Berkeley. Mr. Rowan was an analytical statistician with the National Cancer Institute and is now with the Navy Department. Dr. Erickson is associate director, Institute of Pathology, University of Tennessee, and professor of pathology. Dr. Siegler was in charge of the cytology laboratory, cancer investigation unit, Memphis, Tenn., and presently is assistant pathologist at St. Luke's Hospital, Cleveland, Ohio. The statistical analysis was made under the supervision of S. J. Cutler of the Biometry Section, National Cancer Institute.

The Data

At the time of the 1950 census there were 164,325 women 20 years of age and older in Memphis and Shelby County. There were 91,294 white and 49,419 nonwhite women in the city of Memphis and 17,881 white and 5,731 nonwhite women in the county outside the city. The nonwhite population is almost entirely Negro.

In order to obtain as reliable estimates of uterine cancer morbidity rates as feasible for the study area, data were collected on cases seen in 1950 and 1951. During these 2 years 970 cases of uterine cancer were seen by physicians and at medical facilities of the area. Of these, 498 were residents and 472 were nonresidents.

A higher proportion of the nonresidents were white (74 percent). The residents were more

Table 1. Number of cases of cancer of the uterus seen in Shelby County during 1950 and 1951, by residence status, race, and site

Primary site	Total			Residents			Nonresidents		
	Total	White	Non-white	Total	White	Non-white	Total	White	Non-white
Total	970	611	359	498	260	238	472	351	121
Invasive neoplasms	883	566	317	441	237	204	442	329	113
Cervix	687	411	276	354	182	172	333	229	104
Corpus	127	112	15	45	34	11	82	78	4
Other and unspecified	69	43	26	42	21	21	27	22	5
Carcinoma in situ of the cervix	87	45	42	57	23	34	30	22	8

evenly divided, 52 percent white and 48 percent nonwhite (table 1). Although 66 percent of the female population 20 years of age and over in Memphis and Shelby County is white, this racial group accounted for little more than half the uterine cancer among residents.

The 498 residents with uterine cancer seen in 1950 and 1951 are fairly evenly divided between those first diagnosed in 1951, in 1950, and prior to 1950 (table 2). The number of invasive uterine malignancies first seen in 1951 was a little less than the number for 1950, but this difference is within the limits of sampling variation. Because the morbidity field study was done in mid-1952, under-reporting for 1951 as compared to 1950 was precluded as a factor responsible for this difference.

The carcinomas in situ of the cervix reported are in part the result of exfoliative vaginal cytology examinations conducted in a few of the medical facilities in the area during this time. These data cannot be used to compute rates because the base population examined, from which these cases were identified, is unknown.

Of the 347 residents with uterine cancer initially diagnosed in 1950 or 1951, 34 were not reported by physicians or hospitals but were found in a search of the death records for this period. Many of these patients presumably were only attended medically at or near the time of death and therefore were not reported from the usual sources. Of the 313 living resident cases diagnosed in 1950 and 1951, 290 (92.7 percent) were reported by hospitals, and 23 by physicians only (table 3).

Of the total group of invasive neoplasms reported by physicians and hospitals, 92 percent were microscopically confirmed. The few cases reported by physicians only, presumably women refusing treatment or cases in which the disease was beyond the benefit of therapy, were confirmed microscopically in 61 percent of the cases. The high percentage of cases microscopically confirmed holds true for both racial groups, except for the small group of nonwhite cases seen by physicians only, which were microscopically confirmed in but half the cases. Carcinoma in situ, of course, is a histopathologic diagnosis.

The 347 resident cases of uterine cancer first diagnosed in the years 1950 and 1951, including those discovered from death certificates and not otherwise reported, occurred almost equally in

Table 2. Number of residents with cancer of the uterus seen in Shelby County during 1950 and 1951, by year of diagnosis and site

Primary site	Total	Diagnosed—		
		1951	1950	Prior to 1950
Total	498	169	178	151
Invasive neoplasms	441	139	157	145
Cervix	354	103	125	126
Corpus	45	17	15	13
Other and unspecified	42	19	17	6
Carcinoma in situ of the cervix	57	30	21	6

the white and nonwhite populations (table 4). Although the number of cases of cervical cancer seen among white and nonwhite women in these 2 years was about the same, many more cases of cancer of the uterine corpus occurred among white than among nonwhite women. Again the carcinomas in situ of the cervix diagnosed in these 2 years is shown, but cannot be used for computing rates for the reason previously stated.

The ratio of cancer of the cervix to that of the uterine corpus in other southern metropolitan areas has been found to be in the order of 4 or 5 to 1. In Shelby County, among white women the ratio was 4.5 to 1; but among nonwhite women it was 16.4 to 1. This ratio is unusually high. However, only 7 cases of cancer of the uterine corpus were reported among nonwhite women, whereas there were 20 cases of uterine cancer unspecified as to whether the cervix or corpus was primarily involved. The ratio might be affected considerably if a fair proportion of these latter belong with the corpus group. The cases of uterine cancer that were unspecified as to whether they were primarily in the cervix or corpus constituted 14 percent of

Table 3. Shelby County residents [1] with uterine cancer diagnosed in 1950 and 1951: percent microscopically confirmed by source of report, race, and site

Primary site and race	All cases		Reported by hospitals		Reported by physicians only	
	Number of reported cases	Percent microscopically confirmed	Number of reported cases	Percent microscopically confirmed	Number of reported cases	Percent microscopically confirmed
	All persons					
Total	313	93.6	290	96.2	23	60.9
Invasive neoplasms	263	92.4	240	95.4	23	60.9
Cervix	214	93.4	197	95.4	17	70.6
Corpus	30	96.7	28	100.0	2	50.0
Other and unspecified	19	73.7	15	86.7	4	25.0
Carcinoma in situ of the cervix	50	100.0	50	100.0	0	----
	White					
Total	162	94.4	153	95.4	9	77.8
Invasive neoplasms	140	93.6	131	94.6	9	77.8
Cervix	107	93.4	101	94.0	6	83.3
Corpus	23	95.6	21	100.0	2	50.0
Other and unspecified	10	90.0	9	88.9	1	100.0
Carcinoma in situ of the cervix	22	100.0	22	100.0	0	----
	Nonwhite					
Total	151	92.7	137	97.1	14	50.0
Invasive neoplasms	123	91.0	109	96.3	14	50.0
Cervix	107	93.4	96	96.9	11	63.6
Corpus	7	100.0	7	100.0	0	----
Other and unspecified	9	55.6	6	83.3	3	0
Carcinoma in situ of the cervix	28	100.0	28	100.0	0	----

[1] Excludes cases obtained from death certificates only (1950, 19 cases; 1951, 15 cases).

Table 4. Number of residents with cancer of the uterus diagnosed in Shelby County during 1950 and 1951, by race and site

Primary site	Total	White	Nonwhite
Total	347	176	171
Invasive neoplasms	296	154	142
Cervix	228	113	115
Corpus	32	25	7
Other and unspecified	36	16	20
Carcinoma in situ of the cervix	51	22	29

all the invasive uterine malignancies among nonwhite women, and 10 percent among the white.

The actual numbers of cases occurring among white and nonwhite women given in table 4 do not reflect the relative frequency of occurrence of uterine cancer among these two population groups of women. To determine relative frequency it is necessary to relate the cases to the base population from which these arose in the form of rates per unit of population. Age-specific rates provide a means of making even more refined comparisons as to the relative frequency of occurrence of the disease at different ages. The population figures used in computing the rates given in this report were from the United States Census of Population, 1950. The terms "incidence" and "prevalence" have been defined as:

Incidence. Average annual number of cases first diagnosed during the study period, per 100,000 female population, including cases obtained from death certificates.

Prevalence. Average number of cases known to have had cancer at any time during each study year, per 100,000 female population. This is to be distinguished from the prevalence rate defined in a previous paper (*1*) where the rate refers to the prevalence of undiagnosed cancer, rather than prevalence of diagnosed cancer as used here.

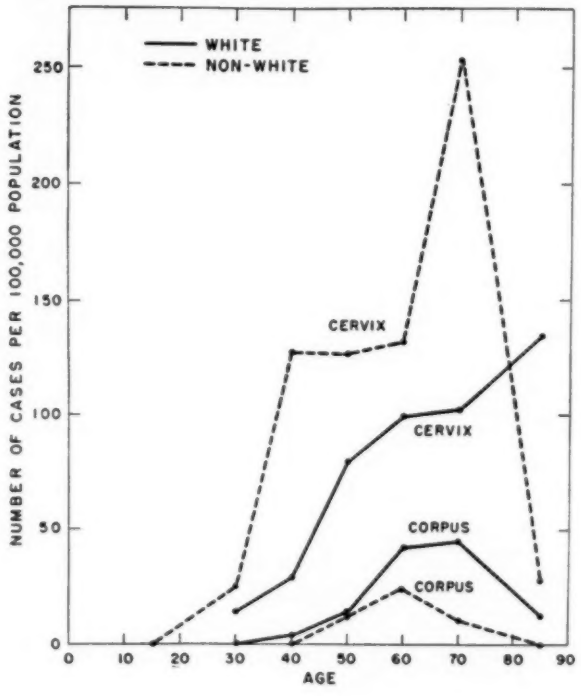
For women of all ages, the age-adjusted nonwhite incidence rate for cancer of the cervix is 1.7 times that for white women, whereas the reverse is true for cancer of the uterine corpus for which white women have over twice as high a rate as do nonwhite women (table 5 and figure). The age-specific incidence rates for cervical cancer among nonwhite women exceed those for white women for all age groups except those 75 years and over. It is likely that the low rate for nonwhite women in this age period is not correct, but is the result of inaccuracies in the age given by elderly nonwhite women with cervical cancer and of under-reporting. This explanation is also suggested by the fact that there were no cases of cancer of the uterine corpus or uterus unspecified in this age group,

Table 5. Residents with uterine cancer, Shelby County, 1950 and 1951, average annual incidence rate per 100,000 population, by race, age, and site

Age and race	Total	Cervix	Corpus	Other and unspecified
	All cases			
Total [1]	62.7	47.7	7.3	7.7
Under 25	.5	.5	0	0
25–34	20.3	19.2	0	0
35–44	86.5	82.5	2.7	1.3
45–54	124.9	98.1	14.3	12.5
55–64	176.4	112.0	36.4	28.0
65–74	237.3	159.6	32.7	45.0
75 and over	148.4	102.0	9.3	37.1
	White			
Total [1]	52.2	37.6	8.9	5.7
Under 25	0	0	0	0
25–34	15.3	15.3	0	0
35–44	58.4	54.1	4.3	0
45–54	103.1	79.6	14.7	8.8
55–64	160.8	101.6	42.3	16.9
65–74	181.8	103.9	45.4	32.5
75 and over	205.1	136.7	13.7	54.7
	Nonwhite			
Total [1]	79.7	64.1	4.4	11.2
Under 25	1.2	1.2	0	0
25–34	30.3	26.9	0	3.4
35–44	131.0	127.6	0	3.4
45–54	158.2	126.5	13.6	18.1
55–64	206.7	132.3	24.8	49.6
65–74	332.1	254.6	11.1	66.4
75 and over	28.8	28.8	0	0

[1] Adjusted for age on the total population of the continental United States, 1950.

Age-specific incidence rates for cancer of the uterine corpus and of the cervix, by race, 1950 and 1951, Shelby County, Tenn.



and by the apparently excessive cervical cancer incidence rate for the 65–74 age group.

The comparison between white and nonwhite women for cancer of the uterine corpus is just the reverse of that for the cervix: The rates for white females exceed those for nonwhite females in all age groups. However, a higher proportion of uterine cancers were unspecified as to cervix or corpus among nonwhite patients, and if these could be properly assigned, the difference in these rates might be somewhat less.

The average annual incidence and prevalence rates of uterine cancer are compared in table 6. For both white and nonwhite women the prevalence is about 1.6 times the incidence of cervical cancer for all ages, and for cancer of the corpus it is 1.4 for white women and 1.9 for nonwhite women. From this it can be said there are a little more than half again as many old uterine cancer cases seen each year as there are newly diagnosed patients.

Discussion

Incidence rates for cancer of the uterine cervix and corpus separately have been difficult to obtain for the general population because frequently the reporting source does not specify which portion of the uterus was the primary site of cancer. Even in this study where cancer of the uterus was the sole interest, the primary site in the uterus could not be determined for 10 percent of white patients and 14 percent of nonwhite patients. However, since about 10 percent of reported cases were obtained from death records where designation as to cervix or corpus is infrequent, the percentage unspecified is about as low as can be reasonably expected.

Since the incidence rates for cancer of the uterine corpus are considerably less than those for the cervix among both white and nonwhite women, they would be affected proportionately more by the assignment of unspecified cases, if this were possible. The age-specific incidence rates for cancer of the cervix, then, are closer approximations to the true rates than are those for the uterine corpus.

Previous morbidity studies have demon-

Table 6. Ratio of uterine cancer prevalence to incidence, by site and race, Shelby County, 1950 and 1951

Race and ratio	Total	Cervix	Corpus	Other and unspecified
	All persons			
Prevalence rate	96. 9	76. 5	11. 2	9. 2
Incidence rate	62. 7	47. 7	7. 3	7. 7
Ratio [1]	1. 55	1. 60	1. 53	1. 19
	White			
Prevalence rate	81. 8	61. 9	12. 5	7. 4
Incidence rate	52. 2	37. 6	8. 9	5. 7
Ratio [1]	1. 57	1. 65	1. 40	1. 30
	Nonwhite			
Prevalence rate	120. 2	99. 2	8. 5	12. 5
Incidence rate	79. 7	64. 1	4. 4	11. 2
Ratio [1]	1. 51	1. 55	1. 93	1. 12

[1] Prevalence to incidence.

NOTE: Rates are expressed as number of cases per 100,000 female population and are adjusted for age on the total population of the continental United States, 1950.

strated that cancer of the uterus is more frequent among nonwhite women than among white. This observation is confirmed by the Memphis-Shelby County data. It also appears, however, that the increased frequency of uterine cancer among nonwhites is not consistent for both the uterine cervix and corpus. While cancer of the cervix, where the bulk of uterine cancers occur, is more frequent in nonwhite women than in white, the uterine corpus is involved less frequently.

As stated earlier, the primary purpose of this morbidity study is to obtain age-specific incidence rates for cancer of the uterine cervix. These rates provide the base of reference for the analysis of data being accumulated from the vaginal cytology survey now being conducted in Memphis and Shelby County. The incidence rates determined here provide a measure of the amount of cervical cancer this female population is producing annually. However, present evidence indicates that cervical cancer, when symptomatic or clinically evident, as it usually is when diagnosed, has already been present many months or years. Therefore, a female population contains many individuals at all times with cervical cancer in various stages of development in addition to those that have progressed to the stage where medical advice is sought and the diagnosis made.

Vaginal exfoliative cytology provides a means of screening a female population to identify those that will be found on detailed study to have presymptomatic and preclinical malignant lesions. Relating these cases to the population of women examined will provide prevalence rates for carcinoma in situ and presymptomatic invasive cancer of the cervix which can be compared to the rates reported here for drawing conclusions as to the probable average duration of the various stages of cervical cancer.

Repeated annual cytologic rescreening of the same population will again provide incidence rates for cervical carcinoma but at a much earlier stage of the disease. If carcinoma in situ of the cervix is the usual precursor of invasive carcinoma of the cervix, then this will be the new stage of recognition of the disease in the population being searched periodically for cervical cancer by exfoliative cytology screening.

Summary

1. The results of a morbidity study of uterine cancer in Memphis and Shelby County, Tenn., are reported.

2. Cervical cancer is a more frequent disease among nonwhite females than white in this community, but the reverse is true of cancer of the uterine corpus.

3. The use of these data as a point of reference for analyzing the data being accumulated in the vaginal cytology screening project now being carried on among the women of this community is briefly discussed.

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The Addition Of Specific Nutrients To Foods

In November 1953, a joint statement of general policy in regard to the addition of specific nutrients to foods was issued by the Food and Nutrition Board of the National Research Council and the Council on Foods and Nutrition of the American Medical Association.

The Food and Nutrition Board of the division of biology and agriculture, National Research Council, was organized in 1940 for the "translation of nutritional science to public welfare." Establishment of the board was a result of efforts of the executive branch of the Government to establish a Consumer Protection Committee as a part of the National Defense Council. To secure scientific guidance for the committee's programs, the National Research Council was asked to set up a Committee on Food and Nutrition. The committee held its first meeting in November 1940 and 1 year later it was given board status and renamed the Food and Nutrition Board.

During World War II, the board served the defense agencies in an advisory capacity, under contract. With the cessation of the war, the Milbank Memorial Fund, the Nutrition Foundation, and the Williams and Waterman Fund of the Research Corporation undertook support of its peacetime activities.

Although it has no authority in governmental or regulatory matters, the Food and Nutrition Board is frequently requested to advise various agencies on nutritional problems. Occasionally, its deliberations form the basis for regulatory promulgations, action programs for health and welfare agencies, and research studies, the results of which might have broad health implications.

The 24 members of the board are chosen for their ability to interpret "the results of food and nutrition research in terms of its broad applications and implications in national and world affairs" (*1*). They are affiliated with universities, research institutions, and industrial organizations and serve without compensation. The governmental and nongovernmental agencies that might be affected by the board's deliberations participate through liaison representatives, but have no voting power. The problems presented are considered by both standing and ad hoc committees, the chairmen of which report to the semiannual meetings. A permanent secretariat is maintained under the administration of the National Research Council for coordinating committee activities and advancing the operational activities and programs resulting from the board meetings.

Some of the committees of the Food and Nutrition Board that have public health implications are those on nutrition surveys, industrial feeding, food protection, cereals, survey of food and nutrition research, fluoridation, maternal and child feeding, definition and standards of identity for foods, dietary allowances, and milk. These committees have developed a variety of standards which have been used in public health activities. The best known of these standards are the Recommended Dietary Allowances (*2*); Tables of Food Composition (*3*); and the previously mentioned statement of general policy in regard to the addition of specific nutrients to foods, which is quoted below.

This short report was prepared by the Laboratory of Biochemistry and Nutrition, National Institute of Arthritis and Metabolic Diseases, National Institutes of Health, Public Health Service.

Standards for Food Additives

"During the 1930's certain nutritional deficiencies were prevalent in the population of the United States, and newly developed synthetic

vitamins were being used in foods with little or no scientific guidance. In 1939, and again in 1946, the Council on Foods and Nutrition of the American Medical Association adopted its policies on the proper additions of vitamins and minerals to foods. In 1941 the Food and Nutrition Board (originally the Committee on Foods and Nutrition) of the National Research Council likewise adopted a policy on the addition of specific nutrients to foods. These statements of policy have now been reconsidered jointly by the Food and Nutrition Board and the Council on Foods and Nutrition in the light of experience and of new developments. There is good evidence to indicate that the policies have been beneficial to the public and have encouraged sound nutritional practices. The policies are therefore reaffirmed in principle, and with revision of wording are embodied in the following statements:

"1. With carefully defined limitations, the principle of the addition of specific nutrients to certain staple foods is endorsed for the purpose of maintaining good nutrition as well as for correcting deficiencies in the diets of the general population or of significant segments of the population. The requirements for endorsement of the addition of a particular nutrient to a particular food include (*a*) clear indications of probable advantage from increased intake of the nutrient; (*b*) assurance that the food item concerned would be an effective vehicle of distribution for the nutrient to be added; and (*c*) evidence that such addition would not be prejudicial to the achievement of a diet good in other respects. These requirements have been met in the specific cases indicated in paragraph 6, below.

"2. The desirability of meeting the nutritional needs of the people by the use of natural foods as far as practicable is emphasized, and to that end education in the proper choice and preparation of foods and the betterment of food production, processing, storage, and distribution so as to provide more fully the essential nutrients native thereto are to be encouraged.

"3. In order to avoid undue artificiality of food supply, foods chosen as vehicles for the distribution of additional nutrients should be, whenever practicable, those foods which have suffered loss in refining or other processing, and the nutrients added to such foods should preferably be the kinds and quantities native to the class of foods involved.

"4. The addition of other than natural levels of nutrients to foods which are suitable vehicles of distribution may be favored when properly qualified judgment indicates that the addition will be advantageous to the public health and when other methods for effecting the desired purpose appear to be less feasible.

"5. Whenever technologic and economic developments lead to extensive reduction in the consumption of a staple food, with a consequent nutritionally significant reduction in the intake of an essential nutrient or nutrients, consideration by qualified bodies should be given to the desirability of restoring such nutrient or nutrients to the dietary.

"6. The endorsement of the following is reaffirmed: The enrichment of flour, bread, degerminated corn meal, and corn grits; the nutritive improvement of whole grain corn meal and of white rice; the retention or restoration of thiamine, niacin, and iron in processed food cereals; and the addition of vitamin D to milk, of vitamin A to table fats, and of iodine to table salt."

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Nutrition in the Americas

"Nutrition Programs in Public Health Services" was the subject of the technical discussions at the seventh meeting of the Directing Council of the Pan American Sanitary Organization and the fifth meeting of the Regional Committee for the Americas of the World Health Organization, held October 9–22, 1953, in Washington, D. C. The discussions, based on replies from the governments of the Americas to questionnaires sent out in advance of the meeting, centered around the prevalence of endemic goiter and kwashiorkor, methods for studying nutrition problems, and nutrition in relation to public health programs.

Presented here are Dr. William H. Sebrell's introductory statement at the meeting, selected portions from a paper on endemic goiter by Dr. Nevin S. Scrimshaw, and excerpts from a summary of the replies to the questionnaires. A complete report of the meeting, including a comprehensive summary of the replies to the questionnaires, is scheduled for publication in the March 1954 issue of the Boletin de la Oficina Sanitaria Panamericana.

Participants in the meeting included representatives from 18 governments of countries and territories of the Americas, and observers were on hand from a number of intergovernmental and nongovernmental organizations.

Developing Modern Nutrition Programs

By WILLIAM H. SEBRELL, Jr., M.D.

It is most gratifying to a nutritionist to have seen the continuing development of nutrition programs in Latin America during the past several years. It would be easy to speak solely of public health gains—of successes—in the nutrition field. Examples are plentiful, for this is a time when the intensive application of knowledge acquired over many years is producing dramatic results. Later, I shall mention practical measures that have raised the nutritional status of whole populations. My remarks, for the most part, will reflect the anticipation of a new era in public health, which is the promise of modern nutrition programs.

This favorable picture, however, must not obscure the fact that malnutrition is still prevalent throughout the world. Intensified efforts to combat it in many regions are imperative. In most of the countries in the Western Hemisphere, including the United States, malnutrition is still present (*1–4*). Effects due to vitamin, mineral, and protein deficiency are reported from many areas. These include pel-

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lagra, beriberi, protein edema, macrocytic anemias, and goiter. Kwashiorkor is a serious problem (*5*, *6*), and in some regions, phrynoderma and ocular lesions prevail.

As an introduction to discussions of approaches public health services may make to the broad problems of nutrition, I will try to synthesize the experience of workers in many countries into procedures applicable to health departments in general.

Appraising Nutritional Status

An initial step in any program should be an appraisal of the nutritional status of the population. This requires both a dietary and a clinical survey. The dietary survey should seek a comprehensive answer to the question: What do the people eat? Analyses of data on food consumption, as well as on the nutritive value of the foods, will provide information on the intake of specific nutrients. These estimates can then be weighed against a standard of recommended nutritional allowances.

To the casual observer, Latin America might seem an unlikely place to find nutrition problems. After all, its agricultural resources and potential are unexcelled. The extent and richness of its land, the length of its growing season, and the variety of its products could surely provide a superior diet to every one of its people. In reality, of course, this is an oversimplification. All the information so far collected indicates that diets in many regions of Latin America are inadequate (*1*, *3*, *7*, *8*). Caloric levels are low in many areas. Diets are frequently deficient in essential nutrients, especially vitamin A, riboflavin, and calcium, and shortages of high-quality protein are common.

Exemplary dietary surveys have been conducted by the National Institute of Nutrition in Mexico (*9*). In Venezuela, studies by the National Institute for Popular Nutrition indicate the nature of the problem in that country (*10*). In Puerto Rico, a major nutrition problem has long been recognized. Recent studies by the University of Puerto Rico show that two-thirds to three-fourths of the families subsist on diets clearly inadequate in some or all essentials (*11*).

The program of the Institute of Nutrition of Central America and Panama, which assists in dietary and clinical nutritional appraisals, is an outstanding example of progress. Other activities of the institute include the preparation of educational materials and the study of possible measures for nutritional improvement. This excellent program is attracting worldwide attention.

In a recent report by the Food and Agriculture Organization, some interesting estimates are made concerning Latin America's untapped resources (*1*). Not more than 5 percent of the total territorial expanse has been cultivated, and only two-thirds of that is under crops in a single year. Of course, there are numerous obstacles to initiating the development of land and other resources, but many Latin American countries are making good progress.

The dietary survey, though valuable in itself, must be integrated with a clinical study of the nature and extent of malnutrition. This requires the services of physicians trained in the recognition of deficiency diseases. The value of the clinical study can be greatly enhanced by suitable laboratory tests.

Determining Reasons for Malnutrition

Complete analysis of the problem should not only tell what deficiencies prevail, but should seek the reasons for them. Clinical problems of malnutrition are often less formidable than geographic, economic, and social obstacles to improving the diet. For various reasons some areas produce a narrow range of commercial rather than food crops, such as cotton, sugar, coffee, tobacco, fiber, or rubber. Importation of food may be necessary, though the diet is most likely to be inadequate where incomes are low and food prices high. The problem then is especially difficult. It is sometimes possible to raise livestock or other produce as well as the commercial crop, or cheap staple foods may be nutritionally improved.

Dietary patterns, however, are often very tenacious, and attempts to introduce new and strange foods, such as yeast or even dried milk, may fail without a proper program of education. Over the years, the problem of how to change dietary habits has been studied by such

competent groups as the Committee on Food Habits of the National Research Council (*12*). It is now known that dietary patterns, even though firmly rooted, undergo continual change and may be gradually modified, especially through the education of children.

Planning Corrective Measures

Once the problem has been determined, corrective measures should be planned, with two principal objectives. The first, of course, is to control or eradicate serious clinical malnutrition. The second objective is rehabilitation and the prevention of further nutrition problems. The importance of the latter responsibility is frequently underestimated. So dramatic sometimes are the results of treatment, as in certain vitamin deficiences, that the necessity of establishing an improved dietary pattern may be neglected.

The attainment of these objectives may entail such diverse techniques as education, legislation, food enrichment, demonstrations, and the training of personnel. In all phases of the program, long-range goals, such as the improvement of dietary habits, should be observed; but immediate results may also be necessary. A realistic public health program does not necessarily attack at once the basic factors of malnutrition. In the beginning, it is often expedient to concede to their rigidity and to work within their limitations.

The administration of nutrients in medicinal form is the most direct way to correct certain serious deficiency states. It is also the most temporary way, for in a broad sense it treats the symptoms and not the cause. In the United States, physicians are finding that the use of appetite depressants for the correction of obesity—now our major nutritional disorder—is subject to the same disadvantages. The deleterious dietary pattern remains to produce a relapse and sometimes to discourage further effort.

A well-established technique, which is quickly effective and perhaps the best adjunct to a long-range campaign, is the improvement of staple foods with vitamins, minerals, or other nutritional elements. Such improvement of foods in the United States has been described as low-cost insurance against nutritional ills (*14*). Examples are the addition of thiamin, niacin, riboflavin, and iron to bread, wheat flour, and maize products as a measure against pellagra, beriberi, and iron-deficiency anemia. Other examples are the use of vitamin A in margarine, vitamin D in milk, and iodine in salt.

Practical Value of Nutrition Programs

As proof of the practical value of a nutrition program, no stronger case could be cited than that of pellagra in the United States. In the 1920's and 1930's, this was the United States most serious deficiency disease (*14*). I can well remember when the number of persons afflicted was at least 200,000. In 1928, at the height of reported mortality, there were over 7,000 pellagra deaths, or 6 per 100,000 population. Nearly 98 percent of those occurred in southern States where most of the available land was used for nonfood crops, such as cotton and tobacco.

For the past 25 years, the death rate from pellagra in this country has shown a general downward trend. This is attributable not only to our national nutrition program, but also to better medical treatment, shifting of the population, extensive changes in agricultural practices, and gradual economic improvement in the south.

It is interesting to note the pellagra mortality at key points in the nutrition movement. Pellagra results from a diet low in two nutrients, either of which will prevent it: the vitamin niacin and the amino acid tryptophan. In 1914, Goldberger and his colleagues in the Public Health Service began the studies that soon proved the deficiency origin of the disease. In a short while, they demonstrated that many foods were protective (*15*). Control measures were instituted and gradually expanded. By 1937, the year niacin was isolated, pellagra mortality was about half that in 1928, or 2.5 per 100,000.

Cures with niacin were reported that year by several clinicians, and thereafter the decline was more rapid. In 1943, 2 years after niacin-enriched foods appeared on the market, the rate was 1 per 100,000. By 1951, according to provisional data obtained from the National Office

of Vital Statistics, it had dropped to 0.1, representing an unprecedented low of 208 reported deaths in the entire country. There are indications that even this figure is high, as a result of incorrect diagnoses.

In the United States, as in other countries, mortality data do not reflect the true health importance of the deficiency diseases, since very few affected persons die. It is the number of cases—the people limited in their capacity to work and enjoy life—with whom we are especially concerned. It was therefore gratifying to learn that not a single pellagrin was found among 10,000 recent admissions to the Hillman General Hospital in Birmingham, Ala., one of the country's most prominent centers for pellagra research, in a region where the disease was once rampant.

Another example of a promising nutrition program is the rice enrichment program in the Philippines (*16*). Over 11,000 persons were examined for beriberi before and after the introduction of rice improved with thiamin, niacin, and iron. The incidence of beriberi declined by approximately 90 percent in the study area. A recent report estimates the cost of enriching the rice to be only two- or three-tenths of a cent per pound (*17*). If enriched rice can be made available to all the people of the Philippines, it will undoubtedly control beriberi, which is one of their most serious health problems.

Integration With Other Activities

The organization and development of a nutrition program requires integration with many other medical and social activities. For example, nutrition is an important element in tuberculosis control, school health services, industrial hygiene, dental care, and sanitation. A comprehensive program will include services to local units, education of health department personnel meeting nutrition problems, aid to educational groups, work with physicians, and operation of nutrition clinics.

The relation of nutrition to other health department activities is sharply illustrated by results of malaria control in North India (*18*). As the malaria is reduced, the land becomes useful and economic status rises. In one area, grain and oil mills and other industrial enterprises increased from 11 to 29 over a 2-year period.

We should not overlook the powerful stimulus of improved nutrition to industrial and agricultural output. It is estimated, for example, that better nutrition among workers on certain sections of the new Pan-American Highway has tripled the rate of construction. Improved health through better nutrition and other means would facilitate the approach to adequate food production throughout the world.

For those who protest that their country cannot afford a nutrition program, it can be shown that no country can afford to be without one. The poorer economic classes are most liable to malnutrition, and hence the economic burden is heavily borne by society at large: the employer and the State. The costs may take the form of medical expense, public assistance, and lost manpower, profit, and revenue. On the other hand, the study and treatment of malnutrition may pay very positive dividends, not only to the individual in terms of diminished suffering, but to the employer and the nation as a whole.

Redirection of Programs

I have pointed out that the ultimate objectives of a nutrition program are long-range ones. The value of periodic assessment is thus apparent, and we must persevere, particularly if progress seems slow. Over an extended period, one problem to be expected is an occasional change in program needs, often necessitating a degree of public reeducation. In the United States, the need is shifting from control of deficiencies to nutrition research in the chronic diseases, such as cancer, arthritis, diabetes, arteriosclerosis, dental caries, and mental and neurological disorders.

Control of infectious diseases and maternal and infant mortality—progress attributable in some measure to better nutrition—has resulted in a general aging of the population. With the increased life span, disability and mortality from diseases associated with age have mounted rapidly. The need for reeducation enters when a review of progress against the deficiency diseases erroneously suggests that nutrition science

has reached the point of diminishing returns.

On the contrary, the problem has shifted to one of learning how the various nutrients act within the body—their specific role in metabolism. The extension of nutrition research along these lines has been very fruitful. Many facts pertaining to the chronic diseases are emerging.

Let me mention some of the major health problems in the United States in which the mechanisms of nutrition are definitely implicated. One is obesity, characterized by failure of the appetite to maintain caloric balance—and I begin with this disorder because mortality data indicate that it predisposes to early death from a variety of other causes (*19*). Atherosclerosis, the major arterial disease, involves an excessive deposition of cholesterol, a fatlike substance not only produced in the body but found widely in foods. Diabetes, which afflicts an estimated 2 million Americans, is of course associated with the faulty utilization of carbohydrate. A successful public health program may be expected to throw such nutrition problems into prominence.

Summary

The world today—no nation excepted—faces many needs relative to nutrition. In some areas, there is gross starvation, demanding such measures as emergency feeding, economic support and adjustment, and revision of agricultural practices.

Dangerous deficiencies of particular nutrients are also prevalent. Such deficiencies are common even in regions where calories are adequate. Thus, nutrition surveys are widely required, to indicate the specific treatment needed. Food improvement may be indicated. In every nutrition program, there is need for cooperative efforts among various branches of the health service, government departments, and other organizations.

A permanent program with a long-range view is essential if advances are to be sustained. Changing needs should be anticipated, and these will include the nutrition problems of chronic disease. From the beginning, education of the public, in an effort to establish correct dietary patterns, should be prominent.

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Endemic Goiter In Latin America

By NEVIN S. SCRIMSHAW, M.D., Ph.D.

Both the first conference on nutrition problems in Latin America held in Montevideo in July 1948 and the second held in Rio de Janeiro in June 1950 recognized that endemic goiter is a serious public health problem in most of the countries of Latin America and made recommendations aimed at its prevention. In the 2 years since the Rio de Janeiro conference, considerable progress has been made by a number of Latin American countries in determining the extent of their endemic goiter problem. The report of the successful treatment of endemic goiter with potassium iodate in Central America (*1*) and the effectiveness of iodized salt distribution begun in certain districts of Colombia in 1949 (*2*) give new assurance as to the practicality of prophylactic measures.

Although the problem of endemic goiter in Latin America is more widely recognized than ever before, and present technical knowledge is sufficient to insure the elimination of goiter as a public health problem, few specific additional measures have been taken toward this goal since the Rio de Janeiro conference. New legislation, the implementation of existing laws, and voluntary efforts have lagged behind scientific studies of the problem.

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Treatment and Prophylaxis

The second Latin American nutrition conference recommended that the governments for which endemic goiter is a health problem take the necessary steps to bring about the iodization of salt. In 1950 the distribution of iodized salt was begun in the northern zone of the Department of Caldas in Colombia. Examination of nearly 9,000 school children in this zone in 1952 revealed an average incidence of endemic goiter of 33 percent compared with 90 percent in the 1945 survey (*2*). This represents a decrease of 64 percent in the incidence of endemic goiter in the areas in which salt iodized to 1 part in 20,000 was distributed. Several other Latin American countries are known to have salt iodization programs in at least the planning stage.

The instability of potassium iodide, especially under tropical conditions, and the necessity for drying and packaging salt iodized with this compound have been major obstacles to the introduction of iodized salt in many parts of Latin America. The report from Central America of the effectiveness of potassium iodate in the treatment of endemic goiter may be of far-reaching importance in this regard (*1*). Eight hundred and eleven school children in El Salvador and 197 in Guatemala with an initial incidence of goiter of 34 and 57 percent, respectively, were treated with placebo, 6.5 mg. of potassium iodide, or 8.5 mg. of potassium iodate weekly. During administration periods of 15 and 20 weeks in El Salvador and 25 weeks in Guatemala, the incidence of goiter did not change significantly among the groups receiving placebo, whereas the reduction in endemic goiter among the groups treated with potassium iodide was 40, 33, and 62 percent, respectively, in the three trials, and among the groups treated with potassium iodate, the reduction was 44, 44, and 69 percent. At the end of the treatment

period in Guatemala, the average protein bound iodine level in the blood serum was 2.68 in 24 children receiving placebos, 5.10 in 26 children receiving iodate, and 4.97 in 27 children receiving iodide.

Discussion

Although the goitrogenic factors which result in the development of endemic goiter in one area or cultural group and not in another receiving the same amount of iodine are not understood, there is no reason to doubt that endemic goiter can always be prevented by providing the amount of iodine needed. Where soils are naturally deficient in iodine, the food plants and water supply will not furnish enough of this element to prevent goiter and it becomes necessary to supply it by artificial means. Such measures as the use of iodized candy or drops of an iodine-containing solution, while effective for limited groups, do not generally reach those segments of the population with the greatest physiological need, especially pregnant women and adolescent girls. For these reasons, the iodization of salt is almost universally recommended as the prophylactic method of choice.

Since tropical temperatures, excessive moisture, economic factors or local customs have made the iodization of salt with potassium iodide economically impractical or otherwise unacceptable for many areas of Latin America, the demonstration that the iodine of potassium iodate is effective in the treatment of human goiter is of considerable practical significance. Potassium iodate possesses desirable chemical and physical properties which give it potential importance for the iodization of crude salt and pilot plant preparation of such salt has already begun in Guatemala. On the basis of the available evidence (*1, 3*) as to its physiological effectiveness, the WHO Study Group on Endemic Goiter which met in London in December 1952 concluded that where it is not practical to prepare or market a salt which is dry and free from impurities, potassium iodate should be used if the iodization of salt is indicated.

In doing so, however, the WHO Study Group recommended that the rate of iodization be 1 part of iodine per 100,000 parts of salt, whereas the Rio de Janeiro conference had previously recommended a level of 1 part of iodine in 10,000 parts of salt. Argentina and Brazil have legislation specifying a ratio of 1:66,666; Mexico, 1.5:100,000; Colombia, 1:20,000; and the countries of Central America are planning to specify a ratio of 1:10,000. In the United States 1 part of potassium iodine in 10,000 parts of salt is employed, and for many years 1 part in 5,000 was used in salt that did not contain a stabilizer.

In view of the unknown extent to which goitrogenic factors are present in Latin American diets, as well as the lack of information concerning the amounts of salt consumed, and taking into consideration the lack of toxicity of the compounds employed for iodization, the Pan American Sanitary Bureau favors retaining 1 part of iodine in 10,000 parts of salt as the standard. This can be furnished either by iodate or iodide and should result in an intake of at least 100 to 300 micrograms of iodine daily. This is the level employed in the field studies in Guatemala and El Salvador and twice the level used in Colombia. A strong argument against the 1 in 100,000 standard is the observation that the salt commonly used in Central America already has a higher iodine concentration than 1:100,000 even in areas in which endemic goiter is very prevalent (*4*).

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Reports from the Americas On Nutrition Programs

Endemic Goiter

Surveys for endemic goiter have been carried out in 26 countries and territories in the Americas. Goiter was recognized to occur in every one of the countries and to constitute a serious public health problem in the majority. Chile and Uruguay considered goiter to be confined to sporadic cases or limited areas. The United States reported that with the widespread use of iodized salt and the increasingly diversified geographic origin of the food supply, areas with an incidence of goiter greater than 10 percent have not been found in recent years.

Mountainous and highland areas of the continent were those in which the highest incidence of endemic goiter occurred. Cretinism associated with endemic goiter was reported by 9 of the countries, and deaf-mutism from this cause was considered to occur in at least 6.

Legislation requiring the iodization of salt in at least some areas has been enacted in Canada, Mexico, Costa Rica, Colombia, Ecuador, and Brazil.

Kwashiorkor

Syndromes closely resembling kwashiorkor have been recognized to occur in Latin America for many years. In the past, cases of this syndrome have not been distinguished from severe cases of malnutrition and undernutrition lacking the salient features of kwashiorkor.

On the basis of frequency of use and etiological implications, the name *policarencia infantil* is suggested for use in Spanish. In accordance with published studies from Africa and other parts of the world, names such as infant pellagra or avitaminosis are misleading and should not be employed.

Of the countries on the continents of the Western Hemisphere, only Canada, the United States, and Uruguay did not report the occurrence of the kwashiorkor-type syndrome. Of the islands, only Haiti, Dominican Republic, Grenada, St. Kitts, and Antigua did report it. Venezuela and Chile mentioned a high incidence in hospitalized children, whereas most countries merely reported it as widely distributed.

In nearly all countries the importance of a high protein diet in treating this condition is recognized. Some specified dried skim milk; others, protein-reinforced milk (leche albuminosa), fresh milk, and "adequate milk diet."

Public health measures of recognized value in the prophylaxis of this condition included those dealing with the health, welfare, and specific nutritional aspects of programs for pregnant women, infants, and preschool children. For the treatment and rehabilitation of acute cases, hospital care was a necessary part of the public health program in all countries in which the syndrome was frequent or severe.

Dietary Surveys

Considerable progress has been made in the planning and execution of dietary surveys, particularly since the last Latin American nutrition conference held in Rio de Janeiro in 1951. Some dietary survey information is now available for all but two of the countries on continental America, as well as for Bermuda, Puerto Rico, and St. Kitts, but only in the United States, Canada, and Puerto Rico are the surveys reasonably complete for representative population groups and geographic regions. In most of the countries the surveys are still limited at best to school children or to families in a few restricted areas.

Inadequate dietary intakes of vitamin A, calcium, and protein of good quality are reported to be widespread and serious in all of the countries of Central and South America, as well as for certain groups in the United States and Canada. A shortage of riboflavin and other

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A summary of the replies to questionnaires sent out in advance of the meeting is presented here. Replies were received from 37 countries and territories of the Americas, but not all were received in time to be included in the summary.

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vitamins of the B complex also occurs frequently. Diets low in ascorbic acid are frequently encountered in Canada, the United States, and Puerto Rico, but the many indigenous fruits and vegetables rich in vitamin C are eaten in sufficient quantities in most of the other countries to supply adequate amounts of this vitamin.

As the Canadian reply to the questionnaire points out, dietary surveys do not in themselves reveal "nutritional deficiencies," but they do indicate certain food habits which, if continued over a period of time, may lead to deficiencies. They also provide evidence regarding food habits and prejudices invaluable in the planning of nutrition education programs. For these reasons there is a great need for additional dietary survey data for Latin America.

Clinical Studies

Physical examinations giving special emphasis to signs and symptoms possibly related to nutritional deficiency have been carried out in all but two of the countries of continental America. Although school children have received the most attention, work with preschool children, pregnant women, families, and special adult groups has been completed.

An extraordinary variety of clinical signs relating to almost every known deficiency was reported. In part, the signs listed by the United States and Canada were distinct from those reported by the other countries. Swollen epiphyseal joints and bone changes suggestive of rickets, swollen red or purple gums, and overweight in adults are not important considerations for most of Latin America. On the other hand, signs commonly related to vitamin A deficiency—xerosis, follicular hyperkeratosis, powdery desquamation of the skin, dry crackled skin, and even xerophthalmia—were reported to occur widely. Vascularization, pigmentation, and thickening of the conjunctiva and circumlimbal corneal vascularization, angular stomatitis, cheilosis, atrophy or hypertrophy of the lingual papillae, and discolorations of the tongue were all mentioned frequently in the replies.

A few of the countries believe the frequent occurrences of gingivitis to be associated with vitamin C deficiency, but the majority ascribe it to poor dental hygiene and consider it of local rather than systemic etiology. Although thiamine deficiency was mentioned as occurring, clear-cut signs of thiamine deficiency were not cited. The incidence of dental caries appeared to be high in most surveys, and growth retardation was almost a universal finding in surveys outside of Canada and the United States. For a given chronological age, small stature, reduced weight, and retarded bone age were reported. These were not apparent in children in two private schools in Guatemala City despite moderate to severe growth retardation encountered in children in public schools in the city and in rural areas. Except in Puerto Rico, few clinical studies have been carried out in the islands. These few indicated that nutritional edema, as well as many of the signs previously mentioned, occurs.

Laboratory Studies

Systematic laboratory studies as part of clinical nutrition surveys appear to have been carried out only in Canada, the United States, Puerto Rico, Mexico, Colombia, Venezuela, Costa Rica, El Salvador, Honduras, and Guatemala. The studies of the Institute of Nutrition of Central America and Panama in the last four countries have included determinations of serum total protein, albumin, globulin, ascorbic acid, vitamin A, carotene, vitamin E, riboflavin, iron, and alkaline phosphatase, as well as liver function, and hematological, parasitological, and radiological studies on large numbers of school children and other population groups.

Mild to moderate anemias were reported common by all of the countries which have included hematological studies in their nutrition surveys. These were frequently of the macrocytic hypochromic type, although in known hookworm areas a microcytic or a mixed type of anemia was often found.

The laboratory studies have been of value, particularly in Latin America, in calling attention to certain specific problems, such as vitamin A and C deficiencies, anemia, and liver damage of possible nutritional origin, as well as in confirming the absence of vitamin C and D deficiencies in many areas. Parasitological

studies have been of value in calling attention to the added nutritional stress occasioned by heavy parasite infestations. The use of laboratory studies on a much wider scale as part of nutrition surveys in Latin America would seem to be indicated.

Food Analysis

Food analysis facilities exist in Mexico, Central America, Colombia, Venezuela, Ecuador, Peru, Brazil, Chile, Argentina, and Cuba, as well as in Canada, the United States, and Puerto Rico. Food composition tables have been prepared for Canada, the United States, Puerto Rico, Mexico, Central America and Panama, Colombia, Ecuador, Venezuela, Peru, Argentina, and Surinam. Brazil and Chile reported tables in preparation. Uruguay and Bolivia indicated recent limited studies of food composition. Bolivia reported that equipment for the analysis of the vitamin content of foods had been ordered.

Food analysis facilities in Mexico, Central America and Panama, Venezuela, Brazil, and Ecuador, and probably in several of the other Latin America countries, have been used in cooperative programs with agricultural agencies for the study of the nutritive value of improved varieties of corn, beans, and other basic food plants, and of potential new forages for animals. Many samples of bread, cheese, flour, milk, and other products subject to great variation have been analyzed, and studies of the effect of cooking on the nutritive value of various foods have been conducted in a number of the countries. Although much progress has been made in recent years, it is apparent that a further development of food analysis facilities is required in many of the countries of Latin America and in the Caribbean Islands.

Statistical Data

Statistical data relating to the distribution of population and the production, distribution, importation, exportation, and consumption of food are available in a greater or lesser degree for all of the countries and territories in the hemisphere. Frequently, however, data referring to production are incomplete or in error because the data on the production of food on small individual plots of land are not available. In several of the countries, recent population census figures have not yet been tabulated.

In a few of the countries, elaborate analysis and reports of these data are made, but in the majority relatively little use is made of them in guiding the agricultural and nutritional programs along the lines of greatest national need. Where reports have been prepared, they have urged increased agricultural production and the need for less dependence on imported food. Some of the countries stated frankly in replying to the questionnaire that no use was made of statistical data.

A few of the countries did not answer the questions relating to the relative importance of an overall shortage of food and poor distribution of the existing food supply because of lack of data, but the majority replied that both problems were important for them.

Nearly every country emphasized the preeminent role of the national health departments in nutrition programs.

In many of the countries, agencies need to be designed or created to evaluate available data relating to food supply and consumption, or to carry out further nutrition studies as necessary, and to give technical counsel in regard to nutrition problems to the appropriate governmental and nongovernmental agencies.

Nutrition Education

Nearly all the countries responding to the questionnaire had nutrition sections, nutrition institutes, or designated personnel responsible for initiating nutrition education material, but there was great variation in the amount of work carried out by them. It varied from occasional conferences on nutrition for special groups to the use of all modern means of communication for this purpose.

Despite references to various educational activities, it was evident that work in nutrition education was sporadic and poorly developed in all but 4 or 5 of the countries submitting replies. Feeding programs are frequently administered with no effort to take advantage of the possibilities for nutrition education which they offer. In most of the countries, only limited use is being made of the opportunities for incorporating nutrition material in health education and general education programs.

Dietary Supplementation

All of the countries and territories of the Western Hemisphere have some kind of feeding program. Usually programs have been developed for school children and for women during pregnancy and lactation. Many of the countries also make provision for preschool children and infants. Most of the Latin American countries have received great stimulus in the development of these programs from the programs of the United Nations Children's Fund.

The types of supplementation reported varied from balanced breakfasts, snacks, and lunches to the simple administration or distribution of powdered milk or milk and reinforced margarine, cod liver oil, or vitamin A capsules. All the programs were built around milk distribution, but several of the countries have used vegetable products and meat soups in partial substitution. In Central America special attention has been given to the development of satisfactory menus for supplementary feeding without the use of animal protein. The distribution of food yeast in the Caribbean Islands was a development of interest.

These programs have almost universally received financial support from the national governments, although state and municipal funds frequently have been used. In most of the countries private charitable organizations have made substantial contributions and frequently have been responsible for the supplementary feeding of large numbers of children.

A permanent basis for the maintenance and extension of supplementary feeding programs exists in most of the countries of Latin America. The problems include continuation of the programs without the milk and other supplies previously furnished without cost by the United Nations Children's Fund, improved selection of recipients, incorporation of nutrition education material in feeding programs, the development of menus based entirely on foods of national origin, and the extension of programs to the less accessible parts of many countries.

Training of Personnel

Schools for the training of hospital dietitians exist in Canada, the United States, Puerto Rico, Mexico, Venezuela, Brazil, Chile, Uruguay, and Argentina. The course requirements were reported to vary from 2 to 4 years, and those for practical experience from 0 to 1 year. Usually 6 to 12 months of hospital experience after finishing the didactic work were required for the title of dietitian. The estimated number of dietitians in the Western Hemisphere indicated in the replies was as follows:

United States	10,000	Guatemala	7
Canada	900	Bolivia	6
Chile	212	Bermuda	6
Puerto Rico	200	Colombia	5
Mexico	80	British Guiana	5
Uruguay	45	Ecuador	4
Venezuela	40	Honduras	1
Panama	7	Grenada	1

Brazil reported approximately 400 trained nutrition workers of all types but did not specify the number of graduate dietitians. Argentina, Cuba, and Peru did not reply to the questionnaire. The remaining countries have no dietitians available for menu planning and supervision in their hospitals, other institutions, and feeding programs. It is obvious from these figures that several thousand more dietitians are urgently needed in Latin America to meet minimum hospital and public health requirements.

Outside of the United States and Canada, the number of persons trained annually is relatively small: approximately 30 in Brazil, 25 in Chile, 14 in Puerto Rico, 12 in Mexico, and 8 in Uruguay. New dietitians, thus, are not being trained in adequate numbers to meet the need.

The training in nutrition given to medical students is generally inadequate even in the United States and Canada. Usually no special course is given, and such nutrition training as the medical students receive is incorporated in courses in physiology, biochemistry, public health, and pediatrics.

Formal courses in nutrition are given to nursing students in all but three of the countries and territories reporting. This training sometimes includes separate courses in normal nutrition and therapeutic diets as well as laboratory or practical work in dietetics. In view of the great variety in the extent and type of instruction indicated, it would seem desirable to specify certain minimum standards for the training of nurses in nutrition.

Field Training In Public Health

An experimental program of the School of Public Health, University of North Carolina

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THE GROWING RECOGNITION of the concept of the community as the patient of public health makes it increasingly evident that education in public health must involve, in much larger measure than heretofore, direct experience with this "patient" as an integral part of the academic school curriculum.

Public health techniques of epidemiological investigation, survey, and analysis can be likened to the diagnostic procedures and techniques developed by medical science for the individual patient over the past 50 years. The teaching of techniques and procedures can be best done, as has been acknowledged in most fields of professional education, by guided practice under close supervision—whether this be bedside teaching in medicine and nursing, chairside teaching in dentistry, or practice teaching in education. Maintaining the medical analogy, field training becomes the "clinical" education in public health, providing for the public health student through practice in the community the equivalent of bedside practice for the medical student. The community is the bedside for education in public health.

Fifty years ago formal medical education was carried on largely in classroom and laboratory, with occasional observation of a patient in the amphitheater or operating room. Today, much of education in public health is at about that stage of development, with only occasional opportunity to observe the "patient" firsthand, and even less opportunity to develop diagnostic and therapeutic skills through guided practice.

Clinical education as an integral part of formal medical education was not arrived at quickly nor easily. Many objections and obstacles were placed in the way of providing the student with bedside clinical experience before he was graduated. The cost alone of such education was an almost insuperable obstacle. The lack of clinical instructors who were real teachers and responsible to the medical schools also delayed the development. But it has been accomplished in medicine, largely as a result of the leadership in medical education provided by the Association of American Medical Schools.

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During the past 5 years the School of Public Health at the University of North Carolina has attempted to develop one approach to the problem of "clinical" teaching of public health by emphasizing "community-side" experience.

With the aid of the W. K. Kellogg Foundation, the Training Branch of the Public Health Service Communicable Disease Center, and the North Carolina State Board of Health, a department of field training was set up as 1 of the 12 departments of the school in 1948. It was not conceived that this department alone could develop the resources and provide "clinical" education for all the disciplines of public health in the school, but rather that it might stimulate and aid the other departments of the school in developing and using the clinical educational approach. Nor was it the purpose to conduct inservice training programs for the States, but rather to provide stimulation and assistance to States in developing the types of inservice training which could meet their particular needs.

Field training can logically be divided into two parts: (*a*) the "clinical," or "community-side," component of the complete professional education, a responsibility of the schools of public health with complete cooperation of the service agencies; (*b*) inservice and continuation education, a responsibility of the service agencies (State and local health departments) with complete cooperation of the schools of public health.

"Clinical" Education

Prior to the establishment of the department of field training, only 2 departments of the School of Public Health—health education and public health nursing—had developed a planned and supervised "clinical" educational experience for their students. Today, 3 more departments—parasitology, nutrition, and biostatistics—routinely require planned and supervised field experience, and 3 others—sanitary engineering and sanitation, maternal and child health, and public health administration—provide planned and supervised field experience for certain of their students. This "clinical" education is part of the total academic program. Full university credit is given and tuition and fees are charged.

Work for which university credit is given must, of course, meet high educational standards. The most important factor in obtaining a high standard in clinical education is provision of a good instructor—one who can make a good learning experience out of a work situation. The facilities, the health department's excellence, the health status of the community, are of secondary importance. We find that in the past overemphasis has been placed on demonstration centers and training centers as a prerequisite to clinical education. Extending the medical analogy, a student may learn more upon a "sick patient" than upon a "well patient" if he has a good instructor. By concentrating on the instructors, we have found that excellent clinical instruction can be given in a wide variety of health departments and communities. As many as 32 different health departments have been used in a single year, and those used are changed from year to year.

The following techniques have been used to insure high educational standards while at the same time providing the flexibility which will encourage the development of new and better approaches.

1. The tutorial system is followed at the "community-side," with a 1:1 ratio of student to instructor, occasionally a 2:1 ratio.

2. The field instructor is made to feel in every way that he or she is a member of the faculty of the School of Public Health. He is the "clinical professor." He is brought to the university before the student goes to the field and participates in a working conference where detailed plans for clinical instruction are developed.

3. The field instructor meets the student for whom he is to provide clinical instruction, discusses the student's needs and academic experience with both the student and the school's professors, and shares with other instructors the plan, the tools, and the techniques which he expects to use.

4. In the field, the student and the field instructor keep a report of their clinical experience which becomes a part of the curriculum of the next academic quarter for the student.

5. A faculty member of the school visits the

local health department at least once while the student is there. At that time the student and instructor review problems and progress in the educational plan.

6. The field instructor receives a token honorarium from the school, as does the local supervisor and health department.

Health Officers' Continuation Education

The major activities in health officer training have been concerned with the residency program, which assumed importance with the promulgation of the certification requirements of the American Board of Preventive Medicine in 1948. The School of Public Health's department of field training has participated in a series of national conferences devoted to developing and establishing standards, criteria, organizational pattern, and program content. One of these conferences, sponsored by the school in cooperation with the W. K. Kellogg Foundation, was held in Chapel Hill, N. C., in December 1951, and was devoted largely to working out principles and details of the actual training experiences the resident was to receive (*1*).

The department staff developed, in cooperation with the North Carolina Advisory Committee on Training, a residency plan for North Carolina and prepared a handbook for the program. The plan has been approved by the Council on Medical Education and Hospitals, and the Board of Preventive Medicine, and accreditation given to centers in four local health departments: Orange-Person-Chatham-Lee District, Forsyth County unit of the Forsyth-Davie-Stokes-Yadkin District, Charlotte, and Halifax County. Five physicians have taken residency training under the North Carolina program.

A number of short institutes have been developed for local health officers on specific topics which they requested: communicable diseases, radiological health, health of the school-age child, and others.

Training for Sanitation Personnel

Any sound and worthwhile program of in-service training must be developed within the administrative framework and operating policies of the State concerned and must be consistent with the needs and readiness of the State for training activities.

To determine and define the objectives of in-service training for sanitation personnel, a conference was held in April 1950 at the School of Public Health with nationwide participation by training and administrative personnel from Federal, State, and local health agencies. This group formulated and published broad recommendations (*2*), variations of which have been found applicable to many situations by the University of North Carolina and the States. The problems of recruitment, job classification, and personnel turnover in sanitation are intimately associated with training problems. Several meetings of sanitary engineers from the southeastern States were held to consider these problems. A final report was developed, which has been valuable as a guide to job classification in several States (*3*).

Eleven 3-month general field training courses have been conducted for a total of 103 sanitarians in North Carolina, in which the department of field training and other departments of the School of Public Health, the North Carolina State Board of Health, and selected local health departments have cooperated. A total of 7 topical refresher courses each of 1 or 2 weeks' duration, in insect and rodent control, dairy sanitation, and food handling sanitation have been held to stimulate the professional growth and development of the sanitarians. At the request of the respective State departments of health, the department of field training has also assisted in stimulating and developing field training programs in sanitation in Maryland, Virginia, West Virginia, and South Carolina.

As a result of this department's activities and interstate conferences of training personnel, a basic pattern of 12 weeks' field training has been recommended and used successfully in West Virginia, Virginia, and North Carolina. The purpose of this training is to guide newly employed personnel into community health programs with a minimum expenditure of time and funds. Integrated with topical refresher courses, it stimulates continued professional growth and development.

Inservice Education for Nurses

As one step toward determining needs and demands for field training of nurses, a regional conference of representatives from the divisions of local health service and bureaus of nursing of the State health departments in the southeastern States was held in April 1949. The conferees discussed the recruitment and training of public health nurses and set up some priorities with respect to field training needs in the region.

The most immediate need expressed by the North Carolina State Board of Health was for a 3-month training program, combining field training with some didactic instruction, for a group of nurses who were ineligible for admission to a school or department of public health because of graduation from small nursing schools. Such a program was developed, providing training for 20 nurses and utilizing 7 local health departments. The plan included 2 weeks of didactic instruction given at the School of Public Health by members of the department of field training staff with participation from other members of the school faculty, 1 week at the State board of health, and 8 weeks of carefully planned experience in selected local health departments.

A beginning was made in the development of an apprenticeship program for well-qualified nurses entering the field of public health for the first time. Policies adopted included: (*a*) clearance of applicants with the School of Public Health as to eligibility for admission before acceptance; (*b*) evaluation of the apprentice at the end of 4 to 6 months of experience to determine interest in and suitability for advanced training in public health; and (*c*) acceptance by the school of the apprenticeship in lieu of the 3 months of required field experience, provided it covers a period of at least 9 months and suitable reports on the experience are made available to the school. The apprenticeship program was interrupted, when reduced training funds eliminated it from the budget of the State board of health.

Because the number of nurses being recruited into public health in North Carolina was considerably greater than the number for whom advanced training could be provided in the immediate future, another pressing task was the development of a program for a short introductory period of field training or orientation. Budgetary considerations prompted a decision that 5 weeks be the duration of this experience. Over a period of several months subcommittees composed of nurses from the State board of health, local health departments which participated in the training, and the School of Public Health worked on various aspects of the programs, including policies, relationships, objectives, application procedures, experience content, and methods for evaluating and reporting on the work of the trainee. Out of this process was developed a handbook which is now used by all participating departments.

Each year some 25 to 30 nurses receive this introductory field training. As many as 11 different local departments provide the training grounds for from 1 to 5 nurses at a time.

Following completion of the guide for this program, the committees developed a comparable outline for the 3-month field experience required of public health nursing students in the School of Public Health. Although this experience had been provided for a number of years, no systematic statement of policies, relationships, plan, and content had previously been developed.

Recordkeeping and Reporting

Public health records represent a neglected area of training programs. Although records and reports are recognized as essential tools for public health program planning, operation, and evaluation, as well as for teaching, progress in the revision of recording and reporting systems has not kept pace with improvement in the quality of service and expansion of programs. Nor has training in this phase of public health work been promoted as an inservice measure nor offered by the schools to any appreciable extent.

Previous lack of attention to records made it necessary to begin with basic work at the operational level by going into the health departments and demonstrating some of the possible methods of meeting needs. The simplification of service records, the development of a survey-type short course for clerical workers,

and the preparation of guide materials are among the activities undertaken.

A project to revise and simplify service records was carried out at the Orange County unit of the Orange-Person-Chatham-Lee District Health Department, in Chapel Hill in 1950 and 1951 (*4*). This project not only provided a more satisfactory record system for the agency, but also demonstrated the value of group participation in the solution of problems involving the different disciplines. A report on the project, describing the method of development and incorporating copies of the forms and instructions for their use, constitutes a reference used in the seminars on records and office management. These seminars are conducted as a part of the program of study for public health administration and nursing students at the school. Interest in and promotion of better recordkeeping in the health departments to which the students return have come as direct results of the seminars.

Four 2-week courses have been arranged at the School of Public Health for a total of 65 secretaries from local health departments in North Carolina. The purposes of these short courses are to offer instruction to those already employed in clerical positions and to stimulate interest on the part of State and local public health officials in sponsoring suitable academic and inservice programs of study for records personnel. The program of instruction includes lectures on the history and development of public health; the organization and relationships of local, State, Federal, and other health agencies; the administration of service programs; and recordkeeping, office procedures, and elementary statistical methods. The instructors for these courses have included members of the faculties of the School of Public Health and the Woman's College of the University of North Carolina, the State health officer and program directors of the State board of health, and Public Health Service personnel.

Copies of the report on the simplified records project of the Orange County health unit, the training program for clerical personnel, and other guide materials developed and produced in cooperation with the North Carolina public health nurses have been shared with other States and countries. Requests for materials often come through students; sometimes they come from visitors for whom individual conferences are arranged with the staff of the department of field training to discuss the subject.

Experience of the past 4 years has indicated that the basic cause of the unsatisfactory record work is failure to provide sufficient personnel who have the qualifications necessary to fill advanced supervisory and consultative positions. A working conference was sponsored by the department of field training in October 1953 (*5*) to define the area of knowledge and skills involved and to study means of attracting suitable candidates for these positions and types of public health training programs needed to prepare them for such responsibilities. Representatives from 13 southern States, the Public Health Service, and the W. K. Kellogg Foundation participated in the conference. The conference recommended a committee to explore possible sources and means of offering a program of study directed toward meeting this need. A number of States are now making plans to start revising their record systems and to develop State training programs for records personnel.

Principles of Field Training

As a result of 5 years of experience in field training in public health, certain principles and conclusions have emerged. It was early found to be inadequate and undesirable to depend on a limited number of established field training or demonstration centers in the usual connotation of highly developed and specially staffed departments designed to provide for all the field training needs of the State. Such field training centers wear out rapidly under continued student load, and they are subject to changes in staff and other circumstances which frequently render them unusable for periods of time. A consideration of the actual needs and potential demands for field training leads to the conclusion that the ultimate meeting of these needs necessitates the use of many local health departments, and that the workers in those used should accept field training as a normal and an expected part of their professional tasks—just as they now accept infant hygiene, communicable disease control, sanitary supervision and others.

Broadening the base of participation in this way creates the problem of developing a sound educational program in an agency whose primary objective and responsibility is service and whose personnel have little or no training or experience in education. This problem has been approached by use of the principle of cooperative joint planning in the development of specific training activities. State health department staff members and workers from local departments who serve as field instructors have participated with the faculty of the School of Public Health at every stage of planning, development, and evaluation of the programs. Not only has this cooperation brought the benefits of the wisdom and experience of the health department workers to the planning process, but it has also provided a means of stimulating their interest and given them an understanding of educational philosophy, principle, and techniques. Through this means it has been possible to provide field training experience of a high degree of excellence, using a large number of different health departments.

If community-side, or clinical, training in public health is to fulfill its purpose, it requires as careful planning of the curriculum content, schedule, and methodology as does academic education. Constant efforts have been directed to this end, and substantial progress has been made. Curriculum guides or handbooks have been completed and are being followed in many of the specific programs. Close supervision by an educational director, periodic group evaluation of program and experience by field instructors and supervisors, and the use of objective examinations at the beginning and end of the training period are some of the other techniques which have been used to develop high standards of educational excellence.

Another principle of paramount importance concerns the relationship of field training to other parts of the individual's training and experience. Except on an emergency basis for subprofessional workers, field training should never be used as the only training program or as a substitute for recognized academic training. Rather, it should be used to provide the supervised experience in the field application of public health principles which is such an essential part of the total training program and which can be provided in no other way. It should be planned in the light of the other elements of training and experience which the workers for whom a particular program is planned have had or will have. An individual's total educational experience should be an integrated whole, with each part planned to complement every other part.

School Responsibility

One of the important objectives of these experiments in field training was to determine the contribution which a school of public health has to make to field training. The experience of the University of North Carolina School of Public Health has convinced us that not only does a school of public health have a contribution to make, but it also has a responsibility in this field. The advantages of active participation by the school have been many:

1. The facilities and faculties of the several departments are available for consultation and assistance, thus enriching the programs. For example, the psychiatrist on the school's faculty has participated in seminars on human relations for the various groups of public health workers, and members of the department of health education have conducted seminars and demonstrations on health educational methods and techniques.

2. State health departments have turned naturally to an educational institution for consultation in inservice training. As a result of this relationship it has been possible to apply knowledge and experience gained in one State or area to other States and areas, benefiting all the programs.

3. Close relationship with the Training Branch of the Communicable Disease Center has made it possible to utilize many of the very considerable resources of that agency in the development and evaluation of training programs and has enhanced opportunities for service to other States.

4. The school itself has benefited from close association with the operating problems of the health departments. It has helped to keep the faculty from acquiring the "ivory tower" complex.

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The Commission on Chronic Illness

By DEAN W. ROBERTS, M.D., M.P.H.

THE COMMISSION on Chronic Illness is past the halfway mark in its 7-year life. It is well along in the work it set out to do, although as envisaged by its founders, the effects of this work will extend far beyond the duration of the organization.

The commission is a creation of the American Hospital Association, the American Medical Association, the American Public Health Association, and the American Public Welfare Association, which in 1945 took a concerted step in the attack on chronic disease by forming the Joint Committee on Chronic Illness.

Each of the organizations had been increasingly aware of the magnitude and importance of the problem of chronic illness. Each was intimately concerned with one or more aspects of the problem, and it was apparent that no one of them could move very far toward its solution without encountering the need for help and advice from the others.

The joint committee continued for 2 years, and its work reached its peak in the production of the joint statement, Planning for the Chronically Ill (*1*). By 1947 it was clear that an independent organization under proper auspices would be a powerful instrument for review and assessment of the chronic disease problem. Its members would have unlimited scope for their efforts, unhampered by the inevitable conditioning factors involved in an official relationship with a permanent professional association. At the same time they would have ready access to the resources of knowledge and information which the sponsoring organizations possess.

In May 1948, the National Health Assembly met in Washington for a 4-day session. One of the sections devoted its attention to chronic disease and aging under the chairmanship of Dr. James R. Miller. One of the important recommendations of this section was that "the existing Joint Committee on Chronic Disease of the American Hospital Association, American Medical Association, American Public Health Association and American Public Welfare Association should be continued and constituted as a national commission and its membership should be expanded to include appropriate representatives from other disciplines, organizations, and interests in the field of chronic illness . . ." and that "the work of the commission should be encouraged by the provision of funds from private sources and by support from the Government in the form of both funds and personnel."

Under the leadership of Dr. James R. Miller, a trustee of the American Medical Association, the joint committee constituted itself as the Interim Commission on Chronic Illness in November 1948, and for the next six months developed specific plans for the objectives, organiza-

Dr. Roberts has been director of the Commission on Chronic Illness since July 1, 1952. He was one of the representatives of the American Public Health Association on the Joint Committee on Chronic Illness and a charter member of the Commission on Chronic Illness. From 1945 to 1950 he was chief of the bureau of medical services of the Maryland State Department of Health, where he developed Maryland's medical care program for the indigent and the chronic disease hospital program.

tion, membership, and financial support for the commission.

Its proposals culminated in the establishment in May 1949 of the Commission on Chronic Illness as an independent, nonprofit organization, with Leonard W. Mayo, director, Association for the Aid of Crippled Children, New York, as its chairman.

Membership and Goals

The commission has 34 members representing the medical and other health professions, industry, labor, agriculture, education, welfare, religion, journalism, the social sciences, and the general public. Each member serves as an individual rather than as a representative of an organization. Advice and consultation from any of a panel of 37 technical advisers is available at all times.

Each of the founding organizations has designated a staff associate to the commission. Staff associates have also been assigned by the American Nurses Association, the National League for Nursing, and the American Dental Association. The staff associates serve as liaison between the commission and the organized fields of activity they represent.

Briefly stated, the commission's founders have regarded it as an instrument to bring order, cohesion, and direction to the many related but unintegrated efforts to prevent and control chronic illness and to minimize its disabling effects. Since its founding the commission's philosophy and actions have been subscribed to in the form of financial and other support by two additional national professional associations, seven national voluntary organizations in the health field in addition to the National Health Council, the Public Health Service, three leading foundations, four of the large life insurance companies, and a university.

At its first meeting the commission decided on three main objectives: to gather and transmit information on current activities and plans designed to cope with the many-sided problem of chronic illness; to make or have made new studies needed to provide a sound basis for planning in this field; and to formulate suggested programs of action by national, State, and local agencies and groups. It set six goals:

1. Define the problems arising from chronic illness in all age groups.
2. Pave the way for dynamic programs to prevent chronic illness, minimize its disabling effects, and restore victims to a socially productive place in the community.
3. Clarify the interrelationships of the many professional groups and agencies working in the field.
4. Coordinate the separate programs for specific diseases with a general program designed to meet more effectively the needs common to all the chronically ill.
5. Stimulate in every locality a well-rounded plan for the prevention and control of chronic disease and for the care and rehabilitation of the chronically ill.
6. Modify society's attitude that chronic illness is hopeless.

The commission early decided that it would be able to conduct only a limited amount of research and that to reach its goals it would rely primarily on aiding and stimulating research by others, and on national conferences called under its auspices.

National Conferences

The first of these conferences, cosponsored by the National Health Council and the Public Health Service, was devoted to the preventive aspects of chronic disease. It was held in Chicago in the spring of 1951 (*2*).

The commission had already adopted and elaborated on the 1946 statement of the Joint Committee on Chronic Illness that "the basic approach to chronic disease must be preventive." Now it assembled current knowledge concerning prevention and called together a group of national authorities to explore the present situation and future possibilities.

The conference stressed the need for additional research, including research on screening tests and mass screening programs. It outlined general criteria for evaluation of screening. It asked that research be undertaken to establish the validity and reliability of specific screening tests and suggested studies to improve the planning and conduct of mass screening programs.

The conference concluded that there is an impressive amount of knowledge physicians can

apply in preventing the occurrence of chronic disease, and it gave in detail ways in which the medical profession can use this knowledge to good effect in the community. It also recognized the need for education to the end that individuals will give physicians a chance to help them keep well, before they become ill.

The conference recommendations have found wide use in medical schools, schools of public health, and elsewhere in professional education, and to a lesser extent in community planning.

The conference on care of the long-term patient, to be held in Chicago March 18–20, 1954, will be the second of the commission's national conferences. The Public Health Service is joining with the commission's four founders in sponsoring this conference, and the list of participating organizations carries the names of 39 national groups concerned with one or more aspects of long-term care. Approximately 400 invited delegates, representative of all the disciplines concerned, will attend.

The meeting will focus on the health services needed by the more than 5 million persons who are substantially disabled by chronic illness or other impairment.

The conference will attempt to identify the requirements of the long-term patient in the various stages and degrees of his illness. It will examine existing methods of providing care, explore new methods, and enunciate principles which should guide suggested changes, and suggest patterns for desirable relationships between services, facilities, and programs. It is hoped that it can recommend various ways to improve the financing of long-term care, and that it can establish direction and set next steps for local, State, and national programs for the care of the long-term patient.

To this end study groups across the country have been working for many months, each on a fairly narrow segment of the various aspects of care. Their reports will form a basis for discussion.

At the conference, the members of these study groups, augmented by additional experts drawn from many disciplines, will work in five major committees. These committees and their chairmen are: the patient at home, Dr. Martin Cherkasky, director, Montefiore Hospital, New York City; the patient in an institution, Dr. Anthony J. J. Rourke, executive director, Hospital Council of Greater New York; integration of facilities and services, Dr. Milton Terris, assistant dean for postgraduate education, School of Medicine, University of Buffalo; research, Dr. Thomas Parran, dean, Graduate School of Public Health, University of Pittsburgh; and financing, Dr. Theodore G. Klumpp, president, Winthrop-Stearns, Inc., New York City. Mrs. Lucille M. Smith, Public Health Service, a member of the Commission on Chronic Illness, is executive secretary of the conference.

Rural and Urban Studies

The commission's national conferences are held against a background of other actions and developing activities designed, like the conference, to achieve the commission's stated goals.

Major current undertakings are two studies of chronic illness prevalence and needs for care, one in a rural community, Hunterdon County, N. J., and the other in an urban community, Baltimore, Md.

These are the first studies to measure the needs for various types of care for chronic illness, and they are designed to produce added dividends in terms of new knowledge relating to collection of morbidity data and to the validity and reliability of mass screening procedures.

The rural and urban studies roughly parallel each other and are being conducted through a series of planned steps. A beginning step is an interview with the selected families which constitute the sample. In Hunterdon County the interviews are conducted by specially trained local school teachers and in Baltimore, by Census Bureau staff. The initial interview identifies family members who are reported to have a chronic disease and provides details about the diseases and conditions reported. Permission to consult existing medical records is requested.

The next step is a diagnostic examination and evaluation of a representative sample of the persons reported as having a chronic disease and a sample of those reported to be well. A team composed of a physician, nurse, social worker, and vocational counselor makes this evaluation. This step is expected to establish

or confirm the good health or illness reported in the original interviews and to supply estimates on the services and facilities needed by each patient and the rehabilitation potential of each patient, as well as rehabilitation services required. The team will attempt to determine what preventive medical services could have been helpful and to evaluate the socioeconomic problems which may have been obstacles to treatment and care of the patient.

As another phase of the study, an additional subsample of the population interviewed will be given a battery of screening tests including height, weight, vision, hearing, dental examination, blood sugar, hematocrit, serologic test for syphilis, urinalysis, and electrocardiogram. This step will also include a followup diagnostic examination of a sample of persons for whom the screening tests indicated positive results and similar followup examinations of persons with negative results. The procedure will provide a test of the validity and reliability of the multiple screening tests. It should indicate how much unrecognized disease that can be proved to exist is actually present in a given population; the maximum "yield" through early detection; how much of the unrecognized disease can be brought to light through multiple screening, and at what cost. The answers to these questions will provide a basis for deciding whether present knowledge of multiple screening tests as a method of early detection is great enough to warrant widespread use, and it will help to implement the recommendations of the conference on preventive aspects with respect to evaluation of screening procedures.

The Baltimore study will include, as a final step, rehabilitation services for persons identified as having a rehabilitation potential which might enable them to return to remunerative employment, including housework and homebound industry. Thus, it is expected that the reliability of the method of estimating rehabilitation potential can be evaluated.

Since one of the outstanding facts about chronic illness is the lack of up-to-date national figures, the commission is exploring the possibilities of using the Baltimore and Hunterdon County experience to project a system for collecting accurate national data expeditiously. The Baltimore questionnaire developed by the Census Bureau is an excellent instrument for collecting illness data by interview. Both studies provide a test of the accuracy of the information so obtained, and from this test a plan for error correction could be evolved.

The Hunterdon study is being done in cooperation with the Hunterdon Medical Center, the New Jersey State Department of Health, and the National Opinion Research Center, with the aid of a grant from the Commonwealth Fund. In the Baltimore study, the Census Bureau, Johns Hopkins University and Hospital, and the Division of Vocational Rehabilitation of the Maryland State Department of Education are cooperating. The Commonwealth Fund is assisting in the financing in Baltimore. Both studies have been aided by Public Health Service grants, with the major share of the cost of the Baltimore project being paid from Federal funds.

Nursing Home Patients

A second major research project now under way is a study of characteristics of patients in nursing homes and related establishments, such as homes for the aged, almshouses, and chronic disease hospitals.

There is very little information about these persons. Even the number of patients in nursing homes and the number of such establishments is in doubt, although hazy estimates run upward of 9,000 nursing homes with 150,000 patients. What care these persons need and are receiving is virtually unknown.

The pilot study was done in Maryland with the cooperation of the Maryland State Department of Health, the Maryland Association of Registered Nursing Homes, and the Division of Hospital Facilities of the Public Health Service. It produced detailed information on who the patients are; how long they have been in the various institutions; who pays for their care; what ailments they suffer; the nature and extent of disability; and the kinds and amount of care they receive.

In followup of the Maryland pilot study, 10 other States are now participating in the commission survey, making parallel studies of their nursing homes and related institutions. The

commission is supplying uniform questionnaires and procedures for conducting the survey and the services of a consultant who worked on the pilot study.

Home Care Program Survey

Still a third research project is the survey of home care programs, undertaken by the commission, the Division of Chronic Disease and Tuberculosis and the Division of Public Health Methods of the Public Health Service. It was prompted by the need for factual material with which to answer an increasing volume of inquiries about home care programs as a possible aid in caring for the chronically ill. Its purpose is "to obtain basic factual data on the organization, development, and operation of selected organized home care programs; to formulate broad principles for the organization, development, and operation of home care programs; to make this information available to program operators, consultants, and persons interested in planning new programs; and to describe the use of home care programs in professional education."

Field work began in Richmond, Va., in October 1952. At the invitation of the Richmond Health Department and the Medical College of Virginia, a study team composed of physician, nurse, social worker, and statistician from the Public Health Service gathered pertinent information about the Richmond plan. The study plan was then reviewed, in the light of the Richmond pilot study, to evaluate the schedule forms and the techniques used.

Subsequently, 10 other programs in 8 States were surveyed.

A report is being prepared and should be available in May. It will cover the objectives of the programs in the sample, the auspices under which they operate, the services they provide, administration and staff, eligibility for service under the programs, and source of program funds.

Maintains Clearinghouse

The commission has gathered facts on chronic disease activities of councils of social agencies and community chests, visiting nurse associations, hospitals, medical societies, and health departments. To stimulate community studies of existing resources and their better use, the commission, as one of its first acts, developed and published a model community survey which has been widely used and continues to be in demand.

An active clearinghouse of information on chronic illness programs and activities now under way throughout the country is maintained in the commission's Baltimore headquarters. Through the monthly *Chronic Illness News Letter*, new demonstrations, building programs, studies, and similar activities are brought to the attention of the 10,000 people who receive the publication—persons connected with the many aspects of chronic disease programs.

The complex of interrelated problems touching on chronic illness is so vast that to some it may appear overwhelming. However, it is the experience of the commission that substantial progress can be made by identifying the individual components of the problem and submitting these components to intensive study and research. There are literally hundreds of highly trained persons from many disciplines who singly and in small groups are working with the commission, concentrating on some particular facet of the chronic illness problem. It is clear that when the commission closes its books in 1956, chronic illness will still be with us, but it is not unreasonable to hope and to expect that the nature of the problem will have been considerably clarified and constructive plans for action developed. In any event, that is the end toward which the commission works. Meanwhile, it is encouraging to find that so many communities are alert to the problem, are ready to take action, as soon as they know what action to take.

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Comparison of the MF And MPN Techniques In Examining Sea Water

By M. W. Presnell, W. Arcisz, and C. B. Kelly

RESULTS OF A STUDY comparing coliform density values of sea water obtained by the membrane filter (MF) and the most probable number (MPN) procedures establish the former as a reliable technique if due regard is given to turbidities and bacterial densities in determining the volume of sample for filtration. The two techniques gave results 87.1 percent in agreement.

The time- and material-saving features of the MF method as compared with the MPN technique (*1*) make it particularly desirable for examining the frequently large number of samples required for determining sanitary quality of waters in shellfish-producing areas. The Manual of Recommended Practice for the Sanitary Control of the Shellfish Industry (*2*) stipulates that in making bacteriological examinations of shellfish-producing areas the number of samples from each station should be sufficient to give a true picture of the number of coliform organisms present in the water under the various tide and weather conditions occurring during the shellfish-harvesting period. The minimum number of samples required varies, but, where examinations are made to define the line between approved and restricted areas, at least 15 samples per station during the period of survey appear necessary.

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The advantages of the membrane filter in the bacteriological examination of fresh water sources have been indicated (*3, 4*). It has also been suggested that the membrane filter method gives coliform densities comparable to those obtained by the MPN procedure, as applied to fresh water (*5*). Goetz (*6*) reports that in an ocean water survey results obtained by the MF method were more consistent and more accurate than data gathered by standard MPN procedures.

Considering the advantages of the membrane filter method in the bacteriological examination of fresh water, it was deemed advisable to initiate a study to demonstrate the comparative performance of the membrane filter in the examination of sea water. Consequently, the present study, conducted in the Public Health Service Shellfish Sanitation Laboratory at Woods Hole, Mass., was undertaken to determine:

1. The comparison of coliform density values obtained by the membrane filter and the standard MPN procedures.
2. The effect of bacterial densities on the agreement of results by the two methods.
3. The influence of turbidity on the agreement of results by the two procedures.

Materials and Methods

Water samples were collected from three stations selected on the basis of degree of pollution and turbidity. An effort was made to choose stations approximately representative of water qualities defining the three areas of pollution pertaining to shellfish production. Station A represents an approved area (median coliform MPN per 100 ml., 70 or less); station B, a restricted area (median coliform MPN per 100 ml., 70 to 700); and station C, a closed area (median coliform MPN per 100 ml., more than 700).

Samples were collected twice daily from the three stations, at approximately 8:30 a.m. and

1:30 p.m., from November 1952 through February 1953. During this period, tide stages and weather conditions varied widely.

All sample collections were made according to standard procedures (*7*). Sterile, brown-glass bottles with bakelite screw caps, having a capacity of 620 ml., were used for collecting and containing samples.

The elapsed time between the collection and the bacteriological examination of a sample never exceeded 2 hours. Samples were stored at a temperature between 6° C. and 10° C. until examined.

Quantities of a sample used to determine coliform densities by the MPN and the MF methods were from the same bottle. Mixing of the sample was obtained by shaking the sample bottle vigorously 25 times.

Turbidity readings were determined by standard procedures (*7*) and were made on that portion of a sample remaining after appropriate quantities for bacteriological examination had been withdrawn.

The MPN method for determining the bacterial density of a sample consisted of planting 5 replicate quantities in at least 4 decimal dilutions in lactose broth. Gas-producing tubes were confirmed in brilliant green bile broth (*7*).

Sterilization

Filtration techniques, culture media, and incubation conditions employed were those developed and recommended by the Environmental Health Center (*5*). Sterilization of the filtration apparatus, membrane filters, and nutrient pads was accomplished by autoclaving at 121° C. for 15 minutes.

It was found that satisfactory sterilization of membrane filters by autoclaving was obtained by the following method:

Approximately 10 filters as shipped, that is, between nutrient pads and paper disks, were placed in covered petri dishes and autoclaved. Care was taken to limit the height of the stack of filters per petri dish to a point sufficiently low to prevent the top of the dish from contacting the stack of filters. This precaution was necessary since it was found that the weight of the petri dish cover exerted sufficient pressure at sterilization temperatures to cause adherence of the membrane filter to its protective coverings. Filters and pads were stacked vertically in petri dishes. Edges of filters were not allowed to project from between their protective covers. Complete coverage of each filter during autoclaving prevented the edges of the filters from curling and becoming brittle.

Table 1. Coliform densities obtained by MF and MPN methods, station A [1]

Sample No.	Turbidity (p.p.m.)	MF count per 100 ml.[2]	MPN per 100 ml.
1	5	2	4.5
2	5	170	920
3	5	5	2
4	5	2	2
5	5	2	2
6	20	17	33
7	20	3	7.8
8	20	1	13
9	10	4	4
10	10	5	2
11	10	59	79
12	10	4	6.8
13	10	71	79
14	10	2	17
15	5	3	2
16	5	18	46
17	5	11	2
18	10	5	13
19	10	8	7.8
20	5	5	13
21	5	5	4.5
22	10	5	17
23	10	2	2
24	5	3	17
25	5	20	22
26	5	2	1.8
27	10	1	1.8
28	10	9	2
29	5	7	4.5
30	20	2	2
31	5	12	23
32	10	2	4.5
33	10	6	7.8
34	10	4	4.5
35	10	32	46
36	10	11	17
37	5	1	6.8
38	5	1	1.8
39	10	3	33
40	10	6	7.8
41	10	29	17
42	10	4	2
43	10	22	13
44	5	110	33
45	5	35	33
46	5	3	4.5

[1] 20 ml. filtered per membrane filter. [2] Total count of 5 membrane filters.

Sample Volumes

To increase the accuracy of colony counts and to minimize the suppressive effects of excessive

Table 2. Coliform densities obtained by MF and MPN methods, station B

Sample No.	Turbidity (p.p.m.)	Calculated MF count per 100 ml.	MPN per 100 ml.
1	5	50	49
2	5	180	490
3	10	290	700
4	10	270	170
5	10	150	220
6	10	480	790
7	10	110	490
8	10	40	220
9	30	120	230
10	30	80	170
11	30	890	2, 400
12	20	470	700
13	30	840	3, 500
14	50	910	2, 400
15	20	360	790
16	50	1, 200	5, 400
17	10	280	1, 100
18	20	340	170
19	5	730	1, 700
20	20	160	490
21	20	2, 800	7, 900
22	20	2, 100	6, 400
23	20	2, 000	4, 900
24	20	12, 000	11, 000
25	5	310	490
26	20	120	230
27	20	500	490
28	30	650	640
29	30	2, 000	2, 300
30	30	600	1, 100
31	50	3, 100	4, 900
32	30	1, 100	790
33	50	4, 000	4, 900
34	10	560	790
35	10	250	460
36	20	2, 500	1, 400
37	20	1, 000	3, 500
38	10	650	4, 300
39	20	2, 500	4, 900
40	20	1, 100	2, 300
41	20	2, 700	11, 000
42	10	2, 000	1, 300
43	20	440	950
44	10	1, 500	1, 300
45	5	500	330

bacterial density on coliform recovery rates, an attempt was made to filter sample volumes yielding not more than 350 total colonies per membrane filter. In the present study, the choice of sample volumes filtered per membrane filter from the three sampling stations warrants discussion.

On the basis of previous coliform densities obtained by the MPN method, filtration of 100 ml. of sample from station A was indicated. Though it was possible to pass as much as 600 ml. of water (average turbidity 8 p. p. m.) from station A through a filter without its being clogged, volumes in excess of 50 ml. produced a matlike overgrowth. By using 5 membranes and filtering five 20-ml. portions of sample instead of one 100-ml. portion, no overgrowth was noted, and the total colony count of the 5 membranes was never in excess of 350 colonies.

It is postulated that certain types of extraneous matter on the membrane surface serve as a "blotter" to hold fluid which encourages diffuse growth of organisms, thus preventing colony formation. It was noted that overgrowth by noncoliform organisms rarely occurred on filters having moderate to light depositions of extraneous matter. Granular extraneous matter when unaccompanied by fine suspended siltlike material did not interfere with colony formation or serve as a bridge for coalescence.

Experiments employing various turbidity concentrations and various particle sizes and shapes would have to be performed before any definite relationship between turbidities and colony growth and formation could be established.

Bacterial densities in waters from stations B and C showed such wide morning-to-afternoon and day-to-day fluctuations that it was impossible to obtain desired results by employing only one volume of sample for filtration. Satisfactory membrane counts were obtained by filtering 20-ml., 10-ml., and 1-ml. portions from station B and 1-ml. and 0.1-ml. portions from station C. For increased accuracy, duplicate membranes were examined for each sample volume.

Though average turbidities of waters from stations B and C were relatively high, 20 and 14 p. p. m., respectively, no clogged and few overgrown filters resulted even from the maximum volume of water filtered, that is, 20 ml.

Results

Data obtained from stations A, B, and C are presented in tables 1, 2, and 3.

Table 1 is self-explanatory. In tables 2 and 3, the method of calculating membrane counts per 100 ml. needs description. Valid membrane counts from all volumes of a sample filtered were included in calculating coliform counts per 100 ml. Counts were deemed valid

if filters were free from evidence of overcrowding, overgrowth, and excessive noncoliform organisms. Calculations were made as follows:

$$\frac{\text{Total number coliform organisms} \times 100}{\text{Total volume sample filtered}} = \text{Number organisms per 100 ml.}$$

For example, in sample 9 at station B, membrane counts from all sample volumes filtered (duplicate 20-ml., 10-ml., and 1-ml. quantities) were valid. Totaling coliform counts and volumes of water filtered and applying the above equation gives:

$$\frac{75 \text{ organisms} \times 100}{62 \text{ ml. of sample}} = 120 \text{ organisms per 100 ml. of sample}$$

Table 3. Coliform densities obtained by MF and MPN methods, station C

Sample No.	Turbidity (p.p.m.)	Calculated MF count per 100 ml.	MPN per 100 ml.
1	5	2, 500	7, 900
2	5	9, 500	7, 900
3	5	860	1, 300
4	5	500	460
5	5	9, 900	11, 000
6	5	1, 200	3, 300
7	30	5, 300	4, 900
8	30	12, 000	35, 000
9	20	4, 800	3, 300
10	20	7, 600	17, 000
11	10	16, 000	11, 000
12	10	4, 700	3, 300
13	20	54, 000	24, 000
14	20	5, 000	4, 900
15	20	2, 000	4, 900
16	20	19, 000	35, 000
17	20	7, 700	7, 900
18	20	3, 500	11, 000
19	20	5, 300	4, 900
20	20	76, 000	54, 000
21	20	14, 000	13, 000
22	20	140, 000	110, 000
23	5	84, 000	110, 000
24	5	150	78
25	10	2, 900	7, 900
26	20	1, 800	2, 300
27	10	3, 800	11, 000
28	20	23, 000	23, 000
29	20	140, 000	130, 000
30	20	7, 000	13, 000
31	20	4, 200	4, 600
32	20	7, 400	13, 000
33	10	3, 300	3, 300
34	20	6, 800	3, 300
35	10	16, 000	33, 000
36	20	2, 800	1, 300
37	20	6, 000	11, 000
38	10	11, 000	4, 900
39	10	4, 800	7, 900
40	20	23, 000	46, 000
41	10	5, 100	3, 300
42	10	5, 600	4, 900
43	10	3, 800	3, 200
44	20	1, 000	2, 200
45	10	240, 000	130, 000
46	5	14, 000	23, 000
47	10	13, 000	13, 000
48	5	91, 000	220, 000

Table 4. Comparison of coliform densities obtained by MF and MPN methods using 95-percent confidence limit of recorded MPN as a base line

Station	Average turbidity (p.p.m.)	Number of samples	Number of samples agreeing	Number of samples disagreeing	Percent agreement
All stations	14	139	121	18	87. 1
A	8	46	36	10	78. 3
B	20	45	37	8	82. 3
C	14	48	48	0	100

Table 4 gives the percentage of agreement between bacterial densities obtained from samples by the MF and MPN methods. The 95-percent confidence range of the recorded MPN (table 1) was used as a baseline for comparison. For a 5-tube, 3-dilution test, the 95-percent confidence range is the difference between the lower and upper limits; namely, 0.3 to 2.9 times the calculated MPN (*8*). The 95-percent confidence limits were obtained by multiplying the recorded MPN's by the factors 0.3 and 2.9. Those MF counts falling within these limits were considered in agreement.

The percentage agreement of results by the two methods was higher for waters of high coliform density than for waters of low and moderate coliform content.

Summary and Conclusions

Coliform densities were obtained by simultaneous examination of sea water samples by the MF and MPN methods. Comparison of the data revealed that the two techniques gave results 87.1 percent in agreement.

Results obtained by the MF and MPN methods from waters having large coliform counts gave greater percentage agreement than results obtained from waters having a low coliform count.

Water turbidity can greatly influence the coliform recovery rate and should be considered

in conjunction with the bacterial density in determining the volume of sample to be filtered.

The use of small replicate volumes of water is indicated where a single large volume from sources having low bacterial numbers produces overgrowth.

On the basis of results from the present study, it is concluded that the membrane filter method is a reliable technique for determining the coliform densities of sea water if due regard is given water turbidities and bacterial densities in determining the volume of sample for filtration.

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(5) Clark, H. F., Geldreich, E. E., Jeter, H. L., and Kabler, P. W.: The membrane filter in sanitary bacteriology. Pub. Health Rep. 66: 951–977 (1951).

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PHS Advisory Council Appointments

Dr. Wallace M. Yater, director of the Yater Clinic in Washington, D. C., was appointed during November 1953 to the National Advisory Health Council, which advises the Surgeon General on grants in research and public health work. Dr. Yater, a past president of the District of Columbia Medical Society, has been active in clinical and pathological research. He was director of the department of medicine of Georgetown University's medical school and also served as head of the university hospital's department of medicine from 1930 to 1945. He served as civilian consultant to the Medical Department of the Army from 1942 until 1947.

Frank A. Robbins, Jr., for many years a ranking officer of the Harrisburg Hospital in Pennsylvania and a member of the American Public Welfare Association, was appointed during November to the National Advisory Arthritis and Metabolic Disease Council, which advises and makes recommendations on activities of the National Institute of Arthritis and Metabolic Diseases and on grants for research in these fields. Mr. Robbins served as secretary of the Department of Public Assistance of Pennsylvania from 1947 to 1951. A retired steel company executive, he is a member of the American Iron and Steel Institute and of the Engineer's Society of Pennsylvania.

Dr. E. Cowles Andrus, president-elect of the American Heart Association, was appointed to the National Advisory Heart Council. He is one of five newly appointed members of this 15-man body. The council makes recommendations on programs of the National Heart Institute and serves as recommending authority for research and teaching grants on diseases of the heart and circulation. Also named to this council were:

Dr. Owen H. Wangensteen, chief of the department of surgery and professor of surgery at the University Hospital, who has been chairman of the department of surgery at the University of Minnesota since 1930; **Daniel Sherby,** director of the Continental Bank of Cleveland, who was a member of the National Advisory Policy Committee for Health and Welfare, and has served with the Federal Government in other consultative capacities; **Helen L. Curry,** president of the Kansas Council of Women, an organization acting as a clearinghouse for health and other civic activities of 29 statewide women's groups; **Louis E. Leverone,** Chicago, president of the Nationwide Food Service, Inc., and active in the field of business aviation and vocational training, boys clubs, and a number of civic groups.

Modern Sanitation In an Iranian Village

By Frederick F. Aldridge, M.S.S.E.,
Eugene Baird, B.P.H., and
Vigen Gevorkian, B.S.C.E.

THROUGH the cooperative efforts of villagers, the Iranian Ministry of Health, and the United States Foreign Operations Administration (formerly Technical Cooperation Administration), the Iranian village of Ali Shah Avaz, located about 30 miles southwest of Teheran, today has a safe water supply, several hundred sanitary privies, and a sanitary public bath. These facilities have replaced an open ditch water supply and unprotected wells, uncovered shallow pit latrines, and an immersion "pool" public bath.

Mr. Aldridge, a commissioned officer of the Public Health Service now on assignment with the Foreign Operations Administration Mission to India as assistant chief sanitary engineer, was chief sanitary engineer for the Technical Cooperation Administration (now Foreign Operations Administration) Mission to Iran from 1951 to 1953. Mr. Baird, also a commissioned officer of the Public Health Service, is with the Mission to Iran as sanitarian for the Teheran region. Mr. Gevorkian, a graduate student in sanitary engineering at the University of Minnesota, was the Iranian Ministry of Health's sanitary engineer for the Teheran region from 1951 to 1953.

Mr. Aldridge was formerly director of the division of sanitation, and Mr. Baird was district sanitarian, Seattle-King County Department of Public Health, Seattle, Wash. Mr. Aldridge has also served as sanitary engineer for refugee camps in the Middle East, and as chief sanitary engineer of the health division, United Nations Relief and Rehabilitation Administration.

The sanitation program in this village is a part of the public health program of the United States Foreign Operations Administration being carried out in Iran. In the summer of 1951, an area named Shahriar, composed of about 200 villages bordering and just southwest of Teheran, was designated by the Iranian Government as an experimental area in rural improvement. Many letters had come from these villages describing their living conditions and requesting assistance from the Foreign Operations Administration in improving them. United States and Iranian sanitary engineering personnel investigated the problems in these villages and found that the insanitary conditions existed in approximately the same degree in all of them. The village of Ali Shah Avaz was chosen as the starting point for an environmental sanitation program in this area because it is the largest village in the area, with a population of about 400 farmers and small landowners, and because it is the center of the greatest activity for the Iranian governmental agencies, including the Ministry of Health.

Sanitation Problems

The mayor of Ali Shah Avaz called a general meeting of the villagers to discuss the sanitation problems with the United States and Iranian sanitary engineers. The major problems were an inadequate supply of safe drinking water, insanitary privies, and insanitary public bathing facilities.

The principal supply of water for drinking, as well as for bathing and washing clothes, was surplus irrigation water which was carried from a mountain underground source through a ghanat—a series of shafts and interconnecting underground tunnels—to the upper edge of the village and from there through the village in an open ditch called a jube. All along its route through the village, animals wandered through the water at random, women washed clothes and utensils in it, and children waded and played in it. By improvising temporary dams and side ditches, drinking water was conducted into and

An open ditch (left and center) was the principal source of water in Ali Shah Avaz for drinking, bathing, and washing before the sanitation program was begun in the fall of 1951. Another source was hand-dug, uncased, open wells (right), which were sometimes located within a few feet of the family privy.

stored in underground reservoirs, called umbars, filled by gravity flow and located along the path of the open ditch.

Hand-dug, uncased, open wells were another source of drinking water. The water was obtained by means of a rope, bucket, or goatskin bag, and a hand-operated windlass. These wells were often located within just a few feet of the family privy.

Waterborne diseases, such as typhoid and the dysenteries, were constantly in near epidemic form in the village, and they were a major factor in the high infant mortality rate. It has been conservatively estimated that the infant mortality in the average Iranian village is approximately 50 percent in the first year, and that 50 percent of the survivors die before they reach the age of 6 years.

In each compound, which houses from 1 to 3 families, a shallow pit privy was the only means of excreta disposal. The privies were open pits, 3 to 4 feet wide, ranging in depth from 2 to 5 feet depending on the ground water level of the area. Surface drainage and seepage from these pits could easily reach the wells. Flies were observed to breed in the pits and moved freely from them to the food in the houses and shops.

Two underground structures, each with a large pool in the center, were the public baths for the village. The water was heated from underneath the pool by brush and wood fires. Additional water was provided once a month, but the water was never changed. Through the common use of this type of bath, communicable diseases, such as skin infections and even trachoma, could be easily spread.

Sanitation

The first step in getting the sanitation program under way in Ali Shah Avaz was the formation of a community cooperative. This organization, composed of about eight members and a director, represented the village in planning and carrying out the program. The members and director were elected by popular vote on a written ballot.

On October 19, 1951, the drilling of a deep well was begun, and on December 1, 1951, it was completed. The well is located in the center of the village on land donated to the village cooperative by an individual landowner. It is 230 feet deep and provides 25,000 gallons of water a day. The total cost was $10,000, which includes the cost of drilling and the provision and installation of a turbine pump and a 52-horsepower diesel engine.

A pumphouse and a 3,000-gallon storage reservoir were built, for which the Foreign Op-

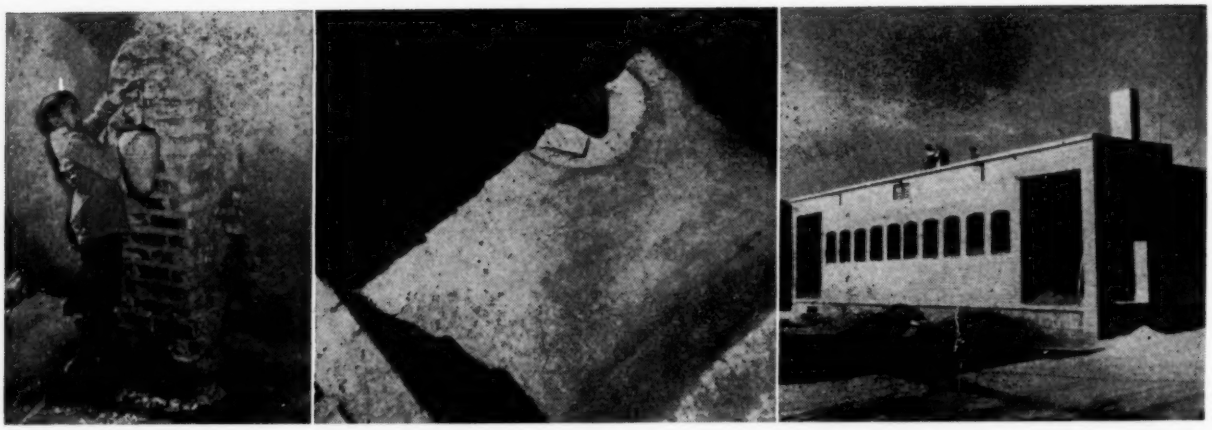
Construction of a pumphouse and storage reservoir (left), with material furnished by the Foreign Operations Administration and labor provided by the village, was a part of the water supply project. Pipeline trenches for a 3,500 foot water distribution system were dug by the villagers (center and right).

erations Administration provided the material and the community cooperative provided the labor. After completion of the reservoir and pumphouse, the villagers dug trenches for a water distribution system consisting of 3,500 feet of 2½-inch galvanized pipe. Water taps were installed approximately 150 feet apart. Two village men were trained to operate and maintain the pump and engine, and after one month's operation under the supervision of the Iranian sanitary engineers, the complete installation was turned over to the cooperative.

For the first time in the history of this village, safe and adequate drinking water is available to the people. In addition, large quantities of water from this well are used for irrigation. The sale of the irrigation water covers the expense of operating the well, including the salaries of the operators and the cost of the fuel and upkeep.

In the privy construction program which began soon after the completion of the water supply system, Iranian sanitarian-aides played an important part. Sanitarian-aides are young men with a sixth- to ninth-grade education who have been trained, in the field and in the classroom, in basic sanitation by the United States and Iranian sanitary engineers. In Ali Shah Avaz, their job was to explain to the people why privies should be constructed in a sanitary manner and how to construct them. Several hundred sanitary privy slabs, designed and provided by the Foreign Operations Administration, were installed by the villagers under supervision of the sanitarian-aides according to specifications drawn up by the sanitary engineers.

With the completion of the water supply system and the construction of sanitary privies, the people for the first time began to understand the true meaning of sanitation. Upon their own initiative, they decided to build a new sanitary public bath. The director of the village cooperative asked the United States and Iranian sanitary engineers for assistance, and several joint meetings were held in the village. It was learned that the cooperative had already purchased the necessary land for a bathhouse site and had raised about half the funds required for the construction of a 14-shower brick bathhouse. The plans, the essential piping and equipment, and supervision of construction were provided by Iranian and American sanitary engineers. The villagers did all the construction work, furnishing both skilled and unskilled labor, and provided the material necessary for the building. The bathhouse was completed and put into operation in May of 1953.



Water taps (left) were installed about 150 feet apart along the principal streets of the village. New sanitary privies were dug and concrete slabs installed (center). With the aid of Iranian and American sanitary engineers, the villagers built a brick bathhouse containing 14 showers (right).

Malaria Control

Along with these improvements in sanitation, a DDT-spraying program to control malaria was undertaken. Malaria has been one of the most prevalent and destructive diseases in Iran from both the health and economic points of view. According to Iranian estimates, 3 to 4 million cases occurred annually among a total population of 17 million. The malaria rate in the average village located in a malarious area ranged from 50 to 100 percent. During the harvest season, crops often rotted in the fields because the farmers were too ill to harvest them. True, they felt better during the winter months, if they survived, but it was then too late to harvest the crop, and a good portion of the year's income and food supply was lost.

In Ali Shah Avaz, the United States technicians discussed with the villagers the importance of malaria control. Ten villagers volunteered to spray the houses in the village. They were given detailed instruction in mixing and spraying DDT and performed the work under the supervision of two Iranian sanitarian-aides. The incidence of malaria has already declined, according to survey studies of the World Health Organization malaria advisory team in Iran. Since spraying will be continued in subsequent years, it can be expected that malaria will eventually be eradicated.

Summary

With the provision of safe drinking water, sanitary bathing facilities, and sanitary privies, the major sanitation problems of Ali Shah Avaz are a thing of the past. Such allied problems as elimination of fly breeding, food sanitation, home sanitation, and school sanitation are still to be solved, but work has already begun on them. The villagers are sincerely desirous of improving the health conditions of their village, and they realize that through modern sanitation many of their prevalent diseases can be greatly reduced, some of them even eliminated. Through the village cooperative, they have learned how to work together for the benefit of the whole community, and with the aid of trained Iranian sanitarian-aides, they are able to cope with their problems. Through modern sanitation, these people are raising their standards of living and are finding a new way of life.

PHR

From 1948 to 1952

Salary Trends for Public Health Workers In Local Health Departments

By PAUL E. FOX, M.A.

MONETARY REMUNERATION ranks well up on the list of job satisfactions. Although most workers tend to give more weight to intangible factors such as work objectives and accomplishments, recognition and the accompanying prestige, and security, the market price of a position still has a significant influence on the ability of an employer to attract and hold competent personnel. Maintenance of full staffs of well-trained and experienced local public health workers requires adjustments of salaries to meet both general economic pressures and specific competitive conditions. The success with which such problems are met in a particular community depends in large measure upon the attitudes of its citizens toward health programs and the strength of the supporting financial structure.

How communities of 50,000 to 250,000 served by full-time local health departments adjusted salaries for their health officers, sanitary engineers, public health nurses, and other professional personnel between May 1948 and April 1952 (*1*) will be examined here in some detail. Although comparative data for 1948 on all groups are not available for larger local health units, the 1952 salary study did include information from departments serving populations of 250,000 and over. Objective measurement of the many factors which influence salaries is beyond the scope of this particular study, but mention will be made here of the interacting forces which seem to be involved in particular situations.

The salaries of each occupational group are affected at different times and in varying amounts by levels of job responsibilities and requirements; numbers of positions available; reservoir of talent to fill positions; competitive status in relation to comparable occupational groups in other governmental programs, in private agencies, in industry and in private professional practice; professional salary standards—national, State or local—which are formulated and promulgated with a view toward improving the relative economic status of a particular occupational group; and special bargaining positions in relation to program demands within a community.

Mr. Fox is a public health adviser with the Grant Operations Branch, Division of State Grants, Public Health Service. Before joining the Public Health Service as an administrative analyst, Mr. Fox was with the Cincinnati, Ohio, Bureau of Governmental Research for 10 years.

Salary Trends by Occupation

Percentage increases in median salaries for seven key occupational groups of local public health workers averaged 27.2 percent between May 1948 and April 1952. Increases in median salaries for the respective groups varied from 19 percent for health educators to 33 percent for sanitary engineers.

Local Health Officers

The median salary for local health officers increased from $6,624 to $8,519, or 28.6 percent.

Source of Data

This paper is based primarily on salary data reported by local health departments serving populations from 50,000 to 250,000, although some data from State health departments are included. Trend comparisons are based on changes in median salaries for seven occupational groups locally—health officers, sanitary engineers, sanitarians, professional laboratory personnel, supervising public health nurses, staff public health nurses, and health educators; for medical personnel in private practice; and for six occupational groups employed by State health departments—health officers, sanitary engineers, sanitation personnel, professional laboratory personnel, supervisory and consultant public health nurses, and health educators. State data for staff public health nurses were not available. Individual identification of local health officers permitted some special analysis of their salaries which was not possible for the other groups.

This is more than the seven-group average, but less than the rate of increase for either sanitary engineers or supervising public health nurses. In the amount of dollar increase it is by far the largest, exceeding the dollar increase in the median sanitary engineering salary by almost $600 (fig. 1).

The competitive pressures of financial rewards to be received in private practice, in larger local health units, and in positions with State health departments must have had considerable effect upon the salary increases given to these local health officers. Some idea of the intensity of these competitive pressures can be obtained from a few related statistics. The 28.6 percent increase in median salary received by local health officers amounts to an annual increment of 7.2 percent. From 1947 to 1951 nonsalaried physicians were increasing their net incomes sufficiently to account for an annual increment of 8.9 percent in median net income (*2, 3*). The median salary for medical personnel employed by State health departments, excluding State health officers, increased at an annual rate of 7.5 percent from August 1948 to August 1952; for State health officers, the annual rate of increase was 10.6 percent (*4*).

Not only was the rate of median salary increase relatively less, but the size of the median salary for local health officers was substantially lower than the median compensations for other medical groups. For example, the April 1952 median salary of $8,519 received by local health officers serving areas with populations of 50,000–249,999 was 30 percent lower than the median net income ($11,191) received by nonsalaried physicians during 1951. State medical personnel also were paid at sufficiently high rates in August 1952 to account for higher median salaries: health officers, $10,684; medical personnel other than health officers, $8,967. Similarly, local health officers in health units serving more populous areas were paid at rates which resulted in substantially higher median salaries: units in the 250,000–499,999 population group, $10,563; units in the 500,000 and over population group, $12,437.

The direct relationship between size of the health officer's median salary and size of health jurisdiction is confirmed by data reported in the Municipal Yearbook (*5*). These data are for city health officers' salaries and for that reason are only generally comparable with the data from the study of salaries in all full-time local health jurisdictions. Median salaries reported for city health officers on both January 1, 1948, and January 1, 1952, varied directly with size of city (table 1).

Table 1. Population and median salaries reported for health officers in 4 groups of cities

Population	Median salary reported		Salary increase (percent)
	Jan. 1, 1948	Jan. 1, 1952	
50,000–99,999	$5,996	$6,455	7.7
100,000–249,999	6,780	8,181	20.7
250,000–499,999	7,650	10,000	30.7
500,000 and over	10,000	11,586	15.9

The largest percentage increase, 30.7 percent occurred for health officers in cities with a population of 250,000–499,999; the smallest, 7.7 percent, for health officers in cities 50,000–99,999. These represent annual increments of 7.7 percent and 1.9 percent, respectively.

The extent to which these salary differentials have affected the ability of communities to employ and hold health officers can be deduced only in part from the statistics at hand. Medical personnel per local health unit increased very slightly between June 30, 1947, and December 31, 1951 (*6*, *7*). Also, if very limited data from the salary studies are indicative, turnover among health officers in these health departments was not too great from 1948 to 1952. Only 173 health departments reported in both May 1948 and April 1952. Of these, 135 reported occupied health officer positions both times. Two-thirds of the incumbents were reported in the same positions on both dates. A one-third change of personnel in 4 years is 8.3 percent per year, which is a higher turnover rate than might be desirable but not so high as to be labeled excessive.

Whether rates of pay were the major factor in the turnover rate, whether other tangible rewards were largely involved, or whether intangible influences of prestige and accomplishment were predominant, the following facts based on comparisons of median salaries computed from limited data are clear: First, the 90 health officers who were reported occupying the same positions in May 1948 and in April 1952 received relatively higher salaries than any other group; second, salaries for the 45 occupied health officer positions experiencing a change in incumbents increased at a greater rate than salaries of any other group (table 2).

Sanitary Engineers and Sanitarians

The median salary for sanitary engineers increased by 33.0 percent between 1948 and 1952; that for sanitarians, 26.3 percent. The increase in the engineers' median salary was almost $1,300 as compared with $700 for sanitarians. The April 1952 median salaries for sanitary engineers and sanitarians were $5,233 and $3,364, respectively (fig. 1).

Many explanations might be given for these changes. Sanitary engineers were in very short supply in 1952. In view of this fact it could be argued that it took a substantial increase in salaries to maintain the 0.4 engineer per local health unit (*6*, *7*).

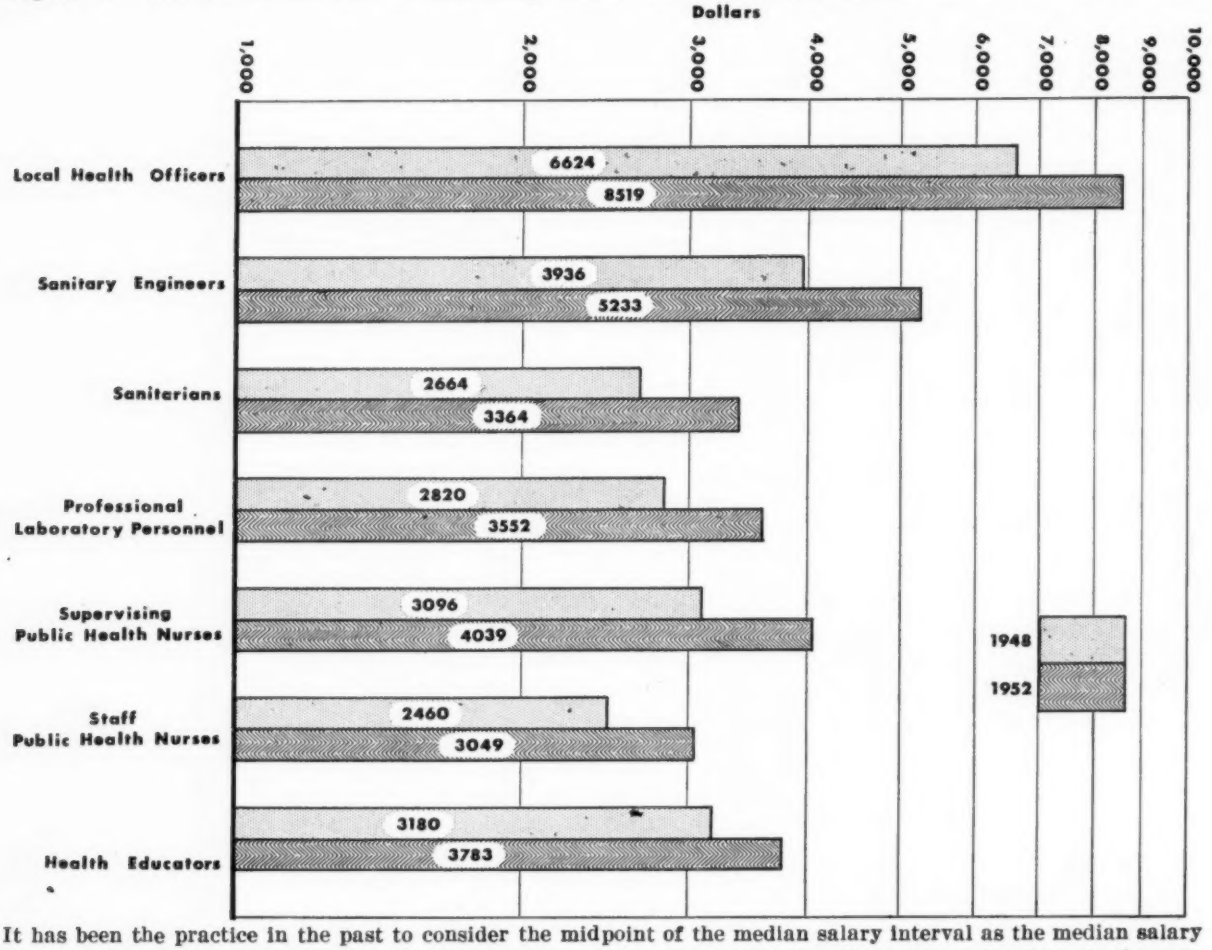
On the other hand, sanitarians reported by local health units increased from 4.0 per unit to 4.7 per unit between June 30, 1947, and December 31, 1951 (*6*, *7*). An inverse correlation between employment and salary trends measured by median salaries for occupational groups seems to exist. In other words, the greater an increase in numbers of employees of a given category, the smaller the percentage increase in median salary. Such a relationship could result from a number of factors. For example, employees are usually taken on at minimum or less than average rates. Except for an occupational group such as engineers, with a ratio per health unit of less than 1, replacements may not be obtainable at existing rates during a period of rising costs of living such as 1948–52. Another characteristic of such a small group is that grade level changes and major revisions of salary scales are more likely to occur here than in larger groups of employees. This would tend to cause a relatively large percentage salary increase.

From the standpoint of diversity of activity, sanitarians constitute the most heterogeneous of the seven groups of local health employees studied. This group is the least profession-

Table 2. Median salaries and percentage increases for health officers in health units reporting, May 1948 and April 1952

Health unit	Number of units reporting	Median salary reported		Salary increase (percent)
		May 1948	April 1952	
All units		$6,624	$8,519	28.6
Reporting both years	173	6,762	8,925	32.0
Same person in position both years	90	6,925	9,083	31.2
Different person in position both years	45	6,300	8,533	35.4

Figure 1. Median salaries for all reporting health units serving populations of 50,000–249,999.



It has been the practice in the past to consider the midpoint of the median salary interval as the median salary for an occupational group. Medians for the purpose of this trend study have been interpolated by the formula $M=Lme+\frac{i}{f}C$.

alized in the sense of generally accepted prerequisites. Job assignments are widely diversified. Training is most frequently obtained after initial employment. Consequently, recruitment is fluid and the supply of potential eligibles rather large. This is reflected in the wide range of salaries paid, from $1,620 to $5,000 in 1948 and from $1,800 to $6,305 in 1952 (*1*). Accessions of employees evidently tend to be in the lower grades and at beginning salaries, thus retarding any increase in the median salary.

Public Health Nurses

There was a $1,000 difference in median salary in April 1952 (fig. 1) and a 6.5 percent difference in percentage increase from May 1948 in favor of supervising, as compared with staff, public health nurses. The 30.4 percent increase in median salary for supervising nurses was exceeded only by the rate of increase for sanitary engineers, while the 23.9 percent increase in staff nurse median salary was the second lowest of the 7 occupational groups.

A per-unit increase of 1.2 public health nurses employed by full-time local health departments was reported between June 30, 1947, and December 31, 1951 (*6, 7*). Separate data on supervising and staff nurses are not available for this period. However, certain similarities between the nursing groups and environmental sanitation groups are apparent. Supervising nurses are much fewer in number. The availability of supervisory and consultative posi-

tions with States, hospitals, and industries would also tend to be reflected in relatively larger salary increases for supervising nurses than could be commanded by staff nurses. Furthermore, the staff nurse is handicapped in salary negotiations by the weight of mere numbers. Administrators, councilmen, and county commissioners are moved to weigh requests for increases in salary for this group more cautiously because even small percentage increases may represent a substantial dollar increase in appropriations.

Whatever the basic causes—recruitment of nurses with less public health training, employment of married nurses, continued use of nurses with long service records who had not taken the additional training necessary to qualify for grade promotions, or other reasons—the $3,049 median 1952 staff nurse salary was only a little more than 75 percent of the supervisory median salary, whereas in May 1948 the staff nurse median was almost 80 percent of the supervisory median.

Although this change does not seem large, a continuing increase in this salary differential could be symptomatic of a serious staffing problem. Whether or not the current campaign to attract women to the nursing profession will benefit local health programs will most certainly depend in some measure on the adequacy of current and potential rates of pay.

Professional Laboratory Workers

Professional laboratory workers probably constitute the most diversified occupational group in terms of range of responsibilities of the seven groups being considered. This is reflected in the difference between the lowest and the highest salaries paid, $1,440 and $11,000, respectively, a difference which surpasses the range of sanitarians' salaries (*1*). This characteristic is different only in degree from that noted previously for sanitarians. Although the April 1952 median salary for professional laboratory workers exceeds that for sanitarians by almost $200, there is a similarity in amount and percentage of salary increases for the two groups:

Group	*Amount*	*Percent*
Professional laboratory personnel	$732	26.0
Sanitarians	700	26.3

Professional laboratory personnel differ from sanitarians in one respect. They are by no means as numerous in the local health units studied. The number per local unit decreased from 1.3 on June 30, 1947, to 0.9 on December 31, 1951. The moderate increase in median salary therefore probably reflects a relatively larger loss of higher paid personnel. It is the only group for which the lowest salary reported in April 1952 was less than the lowest salary reported in May 1948.

Health Educators

Health educators comprised the smallest occupational group of the seven. Only a little over 15 percent of the reporting health departments employed health educators. Even so, it is likely that this group includes subprofessional personnel who are nevertheless reported as health educators.

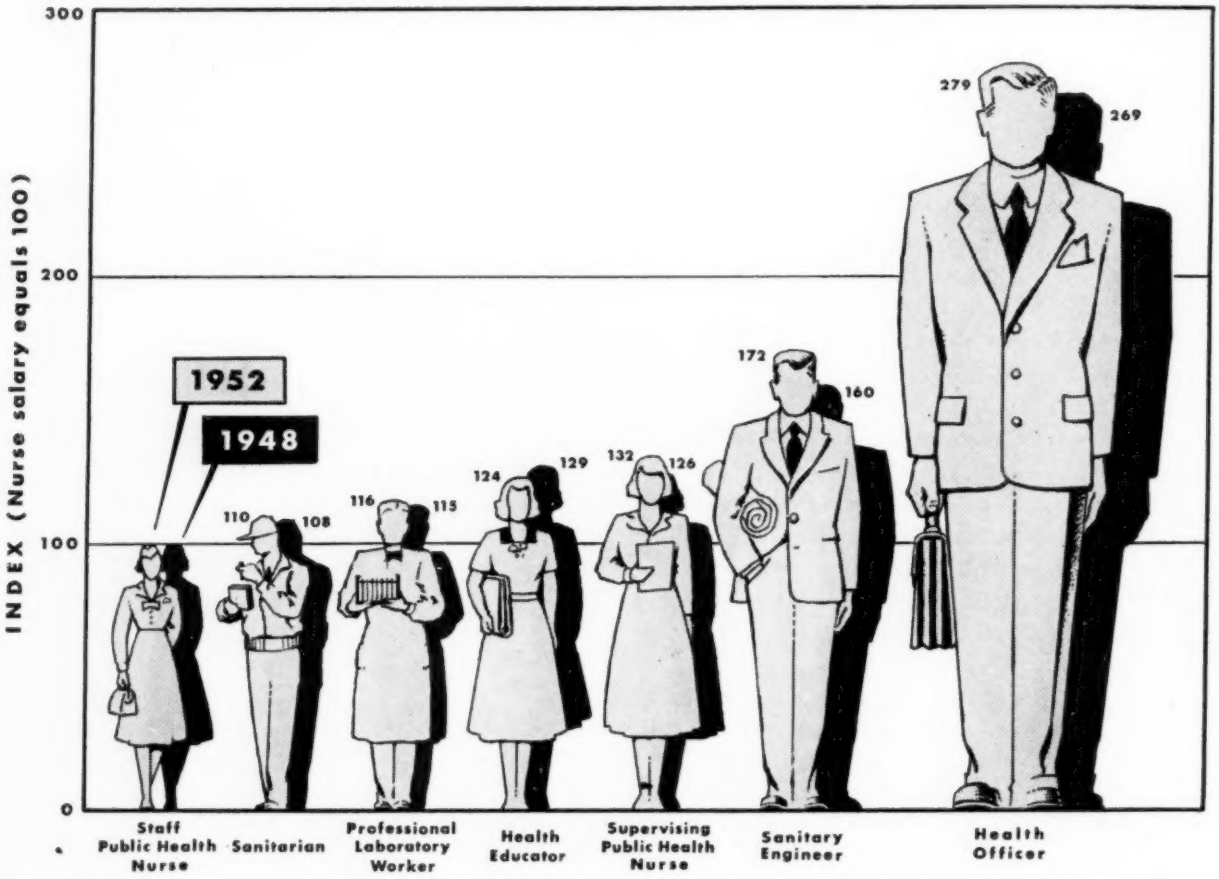
The 1952 median salary for health educators of $3,783 was only 19 percent greater than the 1948 median. This was the smallest percentage increase reported for any occupational group. However, health educators are in a less favorable bargaining position than the other groups from the standpoint of improving their economic status. Salary advances are likely to be modest for a group such as this which is just becoming established. Furthermore, the opportunities for public health educators are probably more limited to the field of public health than those of any of the other six occupational groups.

Changes in Local Salary Structure

The relationships between salaries paid to various staff members are important in maintaining a balanced staff. If the rate of pay for any single group varies too greatly from what the other groups conceive to be reasonable in relation to the duties and responsibilities involved, problems of recruitment, retention, and staff morale increase.

On the basis of median salaries, staff public health nurses are the lowest paid of the seven occupational groups studied. Using staff nurse salaries as 100 percent, the relative positions of median salaries for the other groups have been calculated (fig. 2). In May 1948

Figure 2. Relation of median salaries among seven occupational groups in full-time local health units serving populations of 50,000–249,999, May 1948 and April 1952.



sanitarians were paid 8 percent more than staff nurses; and professional laboratory workers, 15 percent more. Supervisory nurses and public health educators received 26 percent and 29 percent more than staff nurses, respectively; sanitary engineers, 60 percent more. Health officers were paid 169 percent more than staff public health nurses.

Only one change in the relative positions of the respective median salaries occurred in April 1952 as compared with May 1948. Supervisory nurses replaced public health educators as the third highest paid occupational group.

Except for health educators, median salaries for the other occupational groups gained in relation to the median compensation for staff public health nurses. For professional laboratory personnel and sanitarians it was only 1 or 2 percent, but nevertheless, the general tendency was to widen the salary spread between these groups and the staff nurse. These relationships and the changes are illustrated in figure 2.

Median salaries for the largest groups of local public health workers—staff nurses and sanitarians—remained closest together. Increases for the numerically strongest groups are always more difficult to obtain. As stated earlier, small advances here often mean substantial increases in appropriations. Financial pressures tend to hold down the size of salary increases given to large groups of personnel. Staff nurses and sanitarians are the only two occupational groups for which the numbers of personnel per unit are likely to be of a significant factor in salary determinations.

Local Versus State Salaries

State-local comparisons of median salaries are limited because local data for 1948 are available only for health units serving populations of

Table 3. Median salaries of personnel in State health departments and in local health departments serving populations of 50,000–249,999, 1948 and 1952

Type of personnel	State [1]			Local		
	Salary		Percent increase [2]	Salary		Percent increase
	1948	1952		1948	1952	
Health officers	$7,500	$10,684	42.5	$6,624	$8,519	28.6
Sanitary engineers	4,418	5,333	20.7	3,936	5,233	33.0
Sanitarians and sanitation personnel	2,830	4,223	49.0	2,664	3,364	26.2
Professional laboratory personnel	3,164	3,825	20.9	2,820	3,552	26.0
Supervisory and consultant public health nurses	3,401	4,568	34.3	3,096	4,039	23.9
Health educators	3,536	4,278	24.9	3,180	3,783	19.0

[1] The salaries of State directors, reported separately in the published State studies, have been included here with the salaries of personnel in their respective professional groups. This modifies previously published data for these occupational groups: sanitary engineers, professional laboratory personnel, and supervisory and consultant public health nurses.

[2] Rates of increase shown for State public health nurses and sanitation personnel were affected by changes in definitions which resulted in the elimination of State personnel assigned to local health work. Generally speaking, the relatively less responsible positions and lower paid personnel were dropped from the State study. Therefore, the 1948–52 increases in median salaries are larger than they otherwise would have been.

50,000 to 249,999. On this restricted basis comparable local and State data are available for four occupational groups: health officers, sanitary engineers, professional laboratory personnel, and health educators. Median salaries for health officers and health educators increased more rapidly between August 1948 and August 1952 in State health departments than did median salaries for these personnel in local health departments between May 1948 and April 1952.

Quite a different picture is presented when the percentage increases in median salaries for sanitary engineers and professional laboratory personnel, State and local, are compared (table 3). Employment trends undoubtedly had considerable effect upon these changes in median salaries. Local staffs of sanitary engineers per health department were the same in December 1951 as they were on June 30, 1947; professional laboratory personnel decreased slightly (table 4). On the other hand, personnel counts obtained from State plans disclosed a substantial increase in these categories of personnel between January 1, 1948, and January 1, 1952.

It is reasonable to assume that these accessions of State employees would be weighted most heavily with personnel receiving beginning or less than average salaries. Consequently, median salaries would tend to be depressed. In contrast, local median salaries would reflect increases given in a more static employment situation to higher grade, experienced personnel.

Ignoring for the moment the noncomparability of data on nursing and sanitation personnel, the 1948 local median salaries were approximately 90 percent of State health department median salaries. This relationship held true in 1952 for three occupational groups: professional laboratory personnel, supervisory and

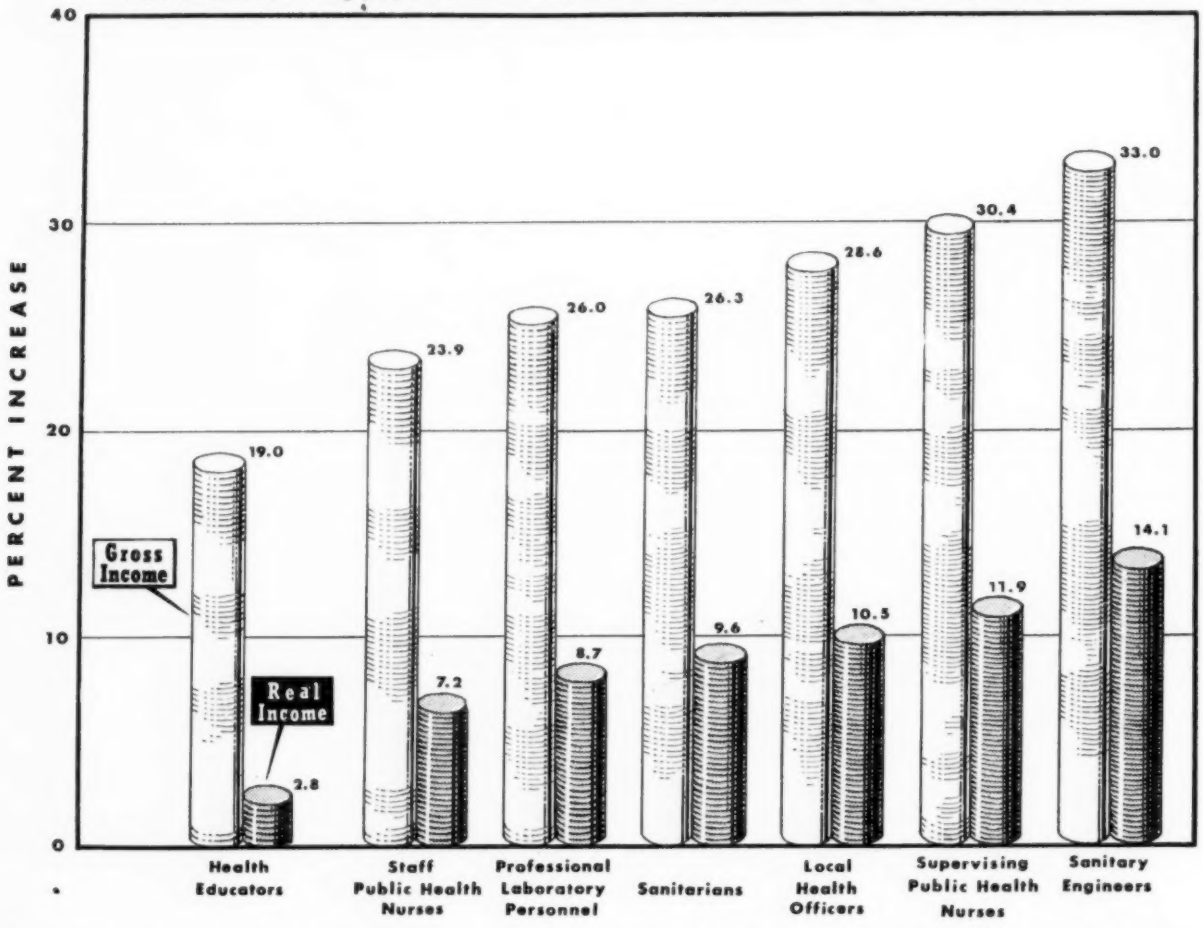
Table 4. Sanitary engineers and professional laboratory personnel in local health departments, June 30, 1947, and Dec. 31, 1951, and in State health departments, Jan. 1, 1948, and Jan. 1, 1952

Type of health department and date	Employees per health department	
	Sanitary engineers	Professional laboratory personnel
Local: [1]		
June 30, 1947	0.4	1.3
Dec. 31, 1951	.4	.9
State: [2]		
Jan. 1, 1948	13.2	28.5
Jan. 1, 1952	16.9	34.6

[1] Full-time local health departments serving populations of 50,000–249,999.

[2] Public Health Service: Schedule C. Annual combined report and plan, fiscal years 1949 and 1953.

Figure 3. Comparison of percentage increases in median gross and real income, full-time local health units serving populations of 50,000–249,999, May 1948 and April 1952.



Cost of living computations are based upon revised Consumer Price Index Series (U. S. Department of Labor, Bureau of Labor Statistics), using 1947–49 average. Federal taxes were computed by allowing four exemptions for health officers, sanitary engineers, and sanitarians; three exemptions for professional laboratory workers; and two exemptions for supervisory nurses, staff nurses, and health educators; and by using standard deductions. For the first group, taxes were computed on a joint return basis, and for the second and third groups, a single family head basis.

consultant public health nurses, and public health educators. Local median salaries for health officers and sanitation personnel dropped to a fraction below 80 percent of the State median salaries. The local median salary for sanitary engineers increased from 89 percent in 1948 to 98 percent in 1952 of the comparable State median salary.

Three significant trends are noted: First, local-State salary relationships remained substantially stable for professional laboratory workers and health educators; second, median salaries for sanitary engineers were equalized for all practical purposes; and third, increases granted to State health officers pushed their 1952 median 8 percent farther ahead of the median for local health officers.

1952 Levels

As a rule, 1952 median salaries for the various occupational groups employed by health departments increased in relation to State median salaries as the population served increased, except for professional laboratory personnel and supervisory public health nurses. Larger staffs which include more assistants were probably responsible for the exceptions.

In 5 instances out of 12, local median salaries

exceeded State medians. Health officers in departments serving 500,000 and more people received salaries which were 16 percent higher on the average (median) than the salaries of State health officers. Median salaries for sanitary engineers and health educators employed by departments serving populations of 250,000–499,999 were less than 0.5 percent higher than comparable State median salaries. Health departments serving areas having 500,000 or more people paid these two groups of employees 12 percent and 10.6 percent more on the average (median) than similar State personnel. On the whole, salaries in the largest local health departments are substantially the same as State salaries. Below 500,000, however, local units are in a progressively more difficult position to compete with State organizations for public health personnel.

Cost of Living and Federal Taxes

Rising costs of living and increasing Federal taxes absorbed half or more of the median salary increases received by local public health workers between May 1948 and April 1952 (fig. 3). For example, the median salary for health officers increased by $1,895, but increases in the cost of living and in Federal taxes absorbed $1,197, leaving an annual salary increment of $175 in real income. Almost 85 percent of the increase received by health educators, who had the smallest percentage increase of any group, was theoretically absorbed by higher living costs and higher Federal taxes. Sanitary engineers, on the basis of such hypothetical tax and cost of living burdens, received in real income slightly more than 45 percent of a $1,297 gross increase in median salary, or an increase of only 14.1 percent in real income for the 4-year period.

Percentage increases in real income based upon median salaries for the seven occupational groups vary from 2.8 percent for health educators to 14.1 percent for sanitary engineers. Changes in median salaries for only three groups—health officers, sanitary engineers, and supervising public health nurses—resulted in calculated increases in real income as large as 10 percent, which constitutes an average annual increase of 2.5 percent.

The relationships explored here only suggest the effects which costs of living and taxes have upon the incomes of salaried persons. These increases in real income may or may not have been sufficient to compensate for the decreases which undoubtedly occurred between 1940 and 1948. Objective data on comparable 1940 salaries of local public health workers are not available. Such data for salaries of State public health workers have been obtained, however, and these would indicate that some groups have more than recovered their economic losses of the 1940's, while other groups have not yet regained their level of income in 1940 (*8*). A detailed consideration of the subject would require much more data and analysis than could be made during this brief study of salary trends.

Summary

1. Median salaries of local public health workers in seven occupational categories employed by health units serving areas of 50,000 to 250,000 increased 27.2 percent on the average.

2. The highest rates of increase in median salaries were recorded for sanitary engineers, supervising public health nurses, and health officers.

3. Health officers' salaries in those units employing the same individual in May 1948 and April 1952 were generally higher than the salaries paid by other units.

4. Local health units employing different individuals in May 1948 and April 1952 increased their health officers' salaries proportionately more than did those units employing the same individual at these times.

5. On the whole local public health workers in the smaller health jurisdictions fared less well in increased compensation than did State public health personnel.

6. More than half of median salary increases were probably absorbed by increased costs of living, including increases in Federal taxes.

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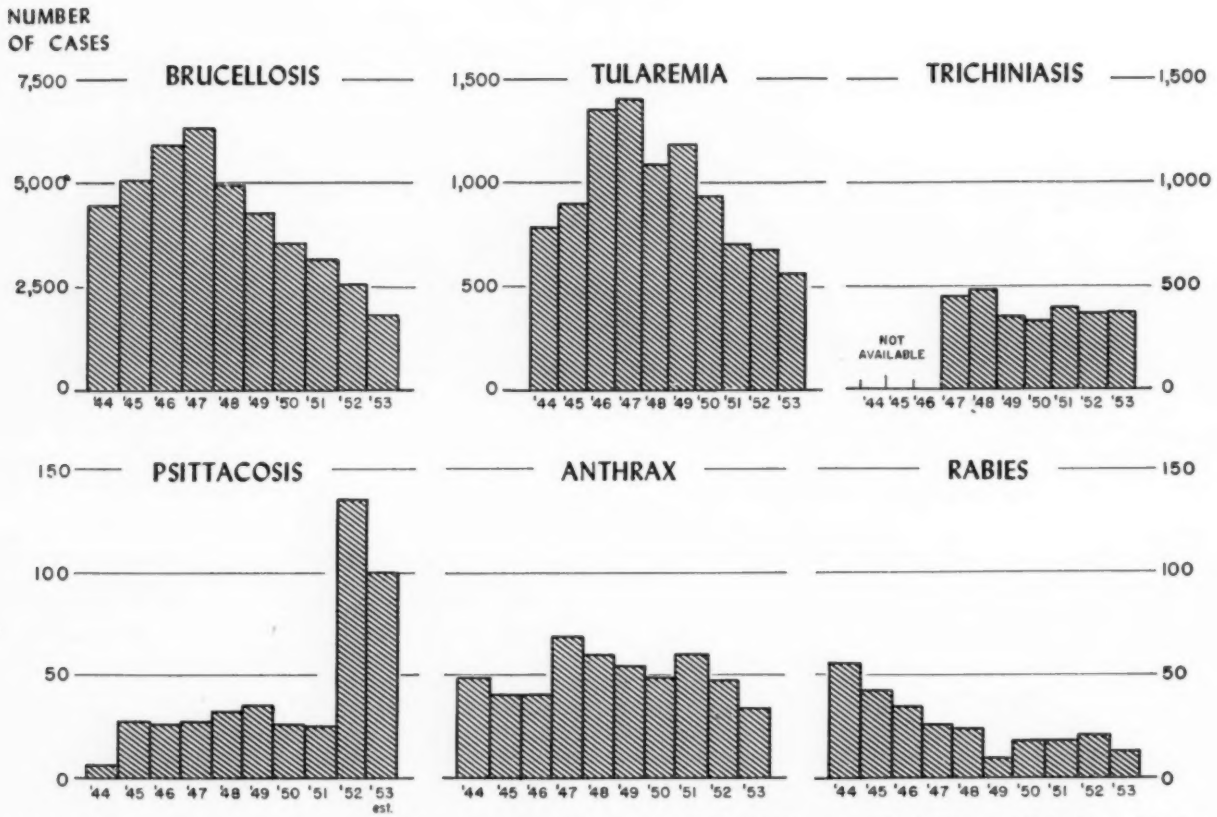
Trends

Reported cases of six animal diseases transmitted to man, United States, 1944–53



NOTE: Charts are reprinted from the January 15, 1954, issue of *Morbidity and Mortality*, published weekly by the National Office of Vital Statistics, Public Health Service.

Syphilis Reservoir Reduced By Serologic Surveys

By Sidney S. Lee, M.D., Dr.P.H.

THERE is no lack of evidence that syphilis is being brought under control and is decreasing in importance as a public health problem. Total syphilis cases reported to the Public Health Service dropped from 575,593 in 1943 to 168,734 in 1952; reported cases of primary and secondary syphilis, after rising from 83,204 in 1943 to a peak of 106,539 in 1947, fell to 11,991 in 1952. However, a recent estimate of 2,100,000 persons in the United States who have syphilis requiring treatment should preclude any sense of complacency about the problem.

To the clinician who formerly saw many obvious clinical signs of the disease, syphilis seems to be a disappearing entity. This is especially true of the dermatologist, who previously was quite secure in considering syphilis as a possibility in every differential diagnosis. However, bizarre skin manifestations are increasingly rare, and there is no longer need for specialist care of uncomplicated syphilis.

To the general practitioner, on the other hand, syphilis is becoming more of a problem. He is the one who may expect to see patients with symptoms of early syphilis in areas where special venereal disease clinic facilities are unavailable or scarce. Simplification of therapy has contributed to the shift of patients to him, and he can now give satisfactory treatment to persons with early syphilis. The general practitioner is also the one who may be expected to see the patient with early symptoms of cardiovascular or central nervous system syphilis, as well as some patients with latent syphilis. Upon his skill depends prevention, in part, of the late, crippling manifestations of the disease.

With so many persons in the general population still in need of treatment for syphilis, alertness to the problem and a high degree of suspicion are essential to continuing reduction in the number of cases. Although in the large majority of patients seen today, syphilis is in a latent stage, many late complications need only to be looked for to be found.

Until recently, case-finding efforts have been directed largely towards finding and bringing to treatment persons with infectious syphilis. However, as the value of current therapy in the prevention and amelioration of disability due to late syphilis has become apparent, the location of cases in later stages has become increasingly important. Concomitantly, the decreasing number of infectious syphilis cases reported has resulted in availability of personnel for case finding of late syphilis.

The Survey

A useful tool in locating latent and late syphilis cases is the serologic survey. While the productivity of total population surveys in terms of cases found and brought to treatment is decreasing steadily, selective testing of segments of the population known or suspected to have high prevalence rates continues to provide a substantial return for the time, effort, and money expended.

During a 3-month period in 1952, such a survey was made of employees in small industries in southeastern North Carolina, under the sponsorship of the New Hanover County Health Department. A total of 1,244 persons were tested in 26 industrial plants employing from 5 to 168 persons. The majority of these plants were in seasonal operation, using unskilled or semiskilled labor, largely Negro.

Of the 1,244 persons tested, 192 (15.4 percent) were positive reactors. While this high reactivity rate is indicative only of the selectivity of

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the sample, the value of the survey rests in the number of patients diagnosed and treated among the reactors found.

All of the 192 reactors were examined by private physicians or in the local health department clinic. Ten patients were found to be false-positive reactors by history, physical examination, and repeat serologic testing. One patient was lost to followup. The remaining 181 patients were diagnosed as having syphilis.

A history of previous treatment was given by 139 patients; 40 patients denied previous therapy; for 2 patients, it was impossible to determine whether prior therapy had been given. Treatment status was confirmed by private physicians, rapid treatment centers, local health departments, and prisons where treatment had been administered.

The following rather rigid criteria were used to evaluate the adequacy of therapy received by patients reporting previous treatment.

1. Arsenic and bismuth therapy only: Less than 20 injections of each drug on a fairly regular schedule was classified as inadequate.

2. Penicillin therapy: Less than 3,000,000 units total therapy was classified as inadequate. No patients fell into this category.

3. Evidence of progression of disease by physical examination, history, or spinal fluid activity (increased cell count, elevation of protein, or by a change in serologic test results from negative to positive).

4. A significant rise in blood serologic titer. No patients fell into this category.

Based on these criteria, therapy of 83 (60 percent) of the 139 patients previously treated was adjudged adequate. Treatment of the remaining 56 patients (40 percent) was considered inadequate and they were placed under penicillin therapy. In addition, the 40 patients who gave no history of previous treatment were brought to treatment. Thus, 96 patients were given needed therapy as a direct result of the testing program.

Of the 96 patients treated, 17 presented evidence of active cardiovascular syphilis or symptomatic neurosyphilis; aneurysmal dilatation of the aorta was seen by X-ray in 7 of these. Of the remaining 79 patients, all of whom were treated for latent syphilis, 32 (41 percent) had active spinal fluids leading to a subsidiary diagnosis of asymptomatic neurosyphilis. This latter group, perhaps, provided the most immediate gain from the survey, as they were all potential candidates for symptomatic neurosyphilis in the near future.

The percentage of patients with late complications of syphilis was essentially the same in the untreated and in the inadequately treated groups. This is significant because in such testing programs locating inadequately treated cases must be considered as of equal importance with finding new cases. To the physician, this finding emphasizes the need for critical evaluation of the patient who gives a history of previous treatment for syphilis.

Conclusions

From the data presented above, it may be concluded that:

1. A sizable reservoir of syphilis cases in need of treatment is still present in the general population. More effort is required to find them than heretofore.

2. Selective serologic testing of suspected high-prevalence groups will yield considerable numbers of syphilis cases, most of which will fall into the late syphilis category.

3. Serologic testing discovers inadequately treated patients as well as those who have never received treatment. Locating inadequately treated patients must be considered an important gain, as they are as likely as untreated patients to become disabled or a burden to the community.

4. While late complications of syphilis are decreasing in prevalence, there are still substantial numbers of patients who present physical signs and symptoms of progression of the disease.

ACKNOWLEDGMENT

The author expresses his appreciation to the health officer, Dr. C. B. Davis, and to the staff of the Consolidated Board of Health, Wilmington, N. C., for their assistance in this study.

The Movement of Patients to Obtain Physician Care

Knowledge of the extent to which persons seek medical care outside their own communities, and of the patterns of travel they follow in so doing, is required for an accurate evaluation of the relative number of physicians, hospital beds, and other health resources available to a community.

The need to obtain such knowledge economically and quickly when a community is confronted with the problem of withdrawal of physicians and allied personnel from communities in time of military mobilization prompted the National Security Resources Board to sponsor a pilot study to explore methods for delineating medical service areas—geographic areas involved in the pattern of intercommunity movement of persons seeking medical care. The study was carried out by the Public Health Service and the Graduate School of Public Health, University of Pittsburgh. Two reports of the findings of the study appear in Public Health Monograph No. 19.

Medical Service Areas

The study covered the 29 westernmost counties of Pennsylvania. Part I of the monograph deals with medical service areas. County and State lines were followed in delineating these areas since the intended application of the findings, as a ready and economical aid in the procurement and assignment of medical personnel for military and defense purposes, would involve the coordination and cooperation of groups organized on a county or State basis as well as the use of readily available statistical data which are similarly organized.

Public Health
MONOGRAPH

No. 19

The accompanying summary covers the principal findings presented in Public Health Monograph No. 19. The senior author, formerly deputy chief of the Division of Public Health Methods, Public Health Service, is head of the department of biostatistics, University of Pittsburgh Graduate School of Public Health. The junior author, on leave from the division, is the statistician for the Commission on Financing of Hospital Care.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch of the Public Health Service. Copies will be found also in the libraries of professional schools and the the major universities and in selected public libraries.

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Ciocco, Antonio, and Altman, Isidore: Medical service areas and distances traveled for physician care in western Pennsylvania. Public Health Monograph No. 19 (Public Health Service Publication No. 248). 32 pages. Illustrations. U. S. Government Printing Office, Washington, 1954.

A medical service area is defined as one which is more or less self-sufficient with respect to the utilization of health resources by its population, either because these resources are adequate or because of factors which discourage any appreciable movement out of the area for services. The essential element which determines a medical service area is the dependence of the population of one political unit on the medical facilities and personnel available in another.

Data were obtained on the size of practice and source of patients of active private practitioners in the study region, the distribution of hospital patients by place of residence, and the distribution of births by place of occurrence and by place of residence of the mother. In addition, as a direct means of gaining information on the extent and direction of the movement of persons from one community to another to obtain medical care, a household canvass was carried out on a sample of the population in 10 counties.

From these data three indexes were calculated: The proportion of patients resident in one county seen by physicians of another county; the proportion of hospitalized persons resident in one county hospitalized in another; and the proportion of babies born in counties other than the residence of the mother. Each of these indexes is considered a measure of one aspect of intercounty movement for medical care: the first, for physician care; the second, for hospital care; the third, for maternity care.

One of the major findings of the study is that the three indexes are highly correlated with each other. On the basis of these indexes, the direction and intensity of the crossing of county lines in the area studied were examined. A measure of dependency of one county on another was determined empirically and employed as the criterion for grouping counties tentatively into medical service areas. The areas so defined by the three indexes were found not only to agree rather well with each other but also with the delineations published by others.

These results indicate that, when more exact delineations are not required, medical service areas can be determined from data which are easily, quickly, and cheaply obtained.

Distances Traveled for Medical Care

Part II of the monograph deals with the distances traveled to obtain the services of physicians. The analysis is based on data from physician questionnaires. The objective was to study any association between the distance traveled to the physician and the frequency with which he is seen.

The questionnaires sent to physicians requested, among other items, the distribution of patients seen in one day, by place of residence, in order that the distances traveled by patients could be measured. A total of 20,100 visits was reported, permitting a detailed examination of the relationship between the distances traveled to the general practitioner and to the specialist and several factors which, a priori, might be expected to be associated with distance.

For each type of county, the frequencies with which different distances were traveled for the different types of practitioner could be described by a hyperbolic curve of form $y=a/x^b$ with a fair degree of approximation. The frequency (y) with which visits to the general practitioner, regardless of type of county, and to the specialist in the greater metropolitan county (containing Pittsburgh) were observed varied inversely as some value (b) between the square and the cube of the distance traveled (x). For the remaining types of counties, the value of the exponent (b) decreased for the specialists as the counties became less urban in character, indicating that relatively more persons were traveling greater distances.

In western Pennsylvania, where distribution of general practitioners within the individual counties is fairly uniform, the average distance traveled to these practitioners varied little between urban and rural counties. To obtain the services of specialists, however, the residents of the more rural counties often traveled long distances and, accordingly, they saw specialists much less frequently than did the residents of other counties.

Hospital Reimbursement for Welfare Patients

—Three Steps to Sound Financing—

By HIRAM SIBLEY, M.A., M.S.

DO HOSPITAL officials and welfare officials—in towns, cities, counties, and States—cooperate fully in explaining to the public and to elected officials why costs in general hospitals are rising and why these hospitals need more revenue?

Rising hospital costs are forcing an increase in hospital rates for welfare patients, and the opportunity for cooperative interpretation by hospitals and welfare officials is too often overlooked when hospitals revise their rates or plan their programs to explain the changes to the public. Past experience indicates that the inflationary spiral continues for hospitals long after it has leveled off for business and industry. Thus, hospital officials are faced with the necessity of explaining both rising costs and the need for additional tax revenue at a time when there is a general outcry for tax reductions.

The cost to the community of hospital care for those people who cannot meet their hospital bills in full can be interpreted in a number of well-established ways. Most of these, however, will not bring results unless the method of reimbursement by welfare agencies for welfare patients is readily understandable and is fair both to the hospital and to the taxpayer. A program of reimbursement will be more readily accepted if it can be written into State statutes or local ordinances for all to see and as a guide to welfare officials.

Various types of hospital reimbursement programs are now included in the State statutes and local ordinances. But one pattern consistently meets the conditions of fairness and clarity. This pattern stems from an agreement between governmental and hospital officials that clearly sets forth which of the needy persons should be cared for from tax funds, which from grants funds for specific illnesses such as poliomyelitis, which from private donations such as community chest funds, and which from hospital endowment or free bed funds. Fortunately, these determinations do not have to be worked out independently in each section of the country, for the growth over the years of practical laws and local customs gives a partial answer.

Hiram Sibley, executive director of the Connecticut Hospital Association (New Haven) since 1948, at the first of the year became director of program development at the Yale-New Haven Medical Center. A lecturer in public health administration at Yale University, Mr. Sibley was also trustee and treasurer for both the Genesee Hospital and the Rochester Hospital Council at Rochester, N. Y.

Determining Responsibility—Step 1

A sound hospital reimbursement program for welfare patients should first determine which of the needy patients should be cared for from tax funds and which from voluntary hospital funds.

Most State governments provide hospital care for patients ill with tuberculosis or mental illness, while local communities provide care for those afflicted with communicable diseases in the infectious stage.

The Federal Social Security Act of 1935 (Public Law 271, 74th Cong., 1st sess.) has established four categories of financial help to the needy for which Federal grants are available

to States: the aged, the blind, the dependent child, and the permanently and totally disabled.

In addition to these four groups, other needy persons or families, sometimes called indigents or paupers, are cared for by their communities when they are unable to provide for themselves the necessities of life—food, shelter, clothing, and medical care. Since the provision of all or one of these is a need that people face in varying ways and in various degrees, it has been difficult for both hospital and welfare officials to draw a clear-cut line for this fifth group between the responsibility of the tax-supported agency and the responsibility of the voluntary agency. This difficulty comes most clearly into focus for those persons who are only unable to provide medical care.

Generally accepted is the proposition that the most needy in this group of indigents or paupers are the responsibility of the tax-supported agency and that the less needy are the responsibility of the voluntary agency. Criteria which will serve as a guide in reaching a decision on greater or lesser need are now in use in many States and localities. The six criteria most commonly adopted in Connecticut are:

The nature and length of the illness.

The earning ability of the patient.

The number of persons dependent on the patient.

The financial resources of the patient.

The financial resources of relatives who might properly be expected to assist the patient.

The value to the community of prompt acceptance of the immediate expense of the patient's care.

Family Budget Yardstick

In addition to these six criteria, a yardstick in the form of a sliding scale can be developed from The City Worker's Family Budget which has been published from time to time by the Bureau of Labor Statistics of the United States Department of Labor. Such a sliding scale has come into general use and has been given recognition by the Connecticut and Illinois State Departments of Welfare in the family budgets they publish for use by welfare officials in determining the amount of assistance to be made available from tax funds to a needy person. However, it must be recognized that at best these criteria and the suggested yardstick can only be guideposts for the welfare official and the hospital credit manager when they consider the problem of needy individuals who each have their own peculiar situations to resolve. However, the criteria and the suggested yardstick do form an objective base for the conscientious welfare official or hospital credit manager.

Opportunity for Cooperation

In the application of these criteria and the suggested yardstick, the welfare official and the hospital credit manager have a great opportunity to work in close cooperation. When they have an understanding of each other's problems, both will discover that welfare statutes must be interpreted strictly and that they allow little opportunity for freedom of action or decision. They will also discover that the voluntary hospital has a far greater flexibility in its approach to welfare patients and is in a position to give prompt and immediate care in emergencies. Where the inflexibility of welfare statutes assures the needy person of suitable care when he meets the requirements set forth in the statutes, the greater flexibility of the hospital corporate setup permits the hospital to fulfill the charitable role so respected throughout the United States.

Cooperative welfare officials and hospital credit managers who recognize this relationship will do a better job for their communities and will be more prompt in meeting the needs of individuals who require medical or hospital care. They will find mutual advantage in using the resources to be found within their communities, such as the central social service index or the credit bureau, which accumulate financial information about local residents. And they will succeed best when they never forget that what they do must first of all be in the interest of the individual patient.

Relating Charges to Cost—Step 2

Hospital reimbursement should be based on an accepted hospital reimbursement formula which is automatically adjusted periodically.

Should the hospital reimbursement formula be based on cost or charges? Since the argument for hospital charges most generally presented is that the voluntary general hospital is

not expected to make money, it would be well to use a cost reimbursement formula and avoid the misunderstandings that develop when hospital charges are the basis of reimbursement. These misunderstandings arise from the failure of many general hospitals to relate charges to cost and from the sometimes overgenerous markup which is made for laboratory and X-ray examinations.

Two Reimbursable Cost Formulas

The "government reimbursable cost formula," which is based on the Handbook on Accounting, Statistics and Business Office Procedures for Hospitals (American Hospital Association, 1950), is generally accepted. It is supported by a detailed chart of accounts, by well-accepted definitions, and by established accounting procedures. It has certain weaknesses, notably its failure to prescribe procedures for segregating outpatient expense from inpatient expense, for separating the expense of a specific revenue-producing service department, for setting up a plant ledger, and for computing depreciation. In addition, the "form of certification by a public accountant" does not require certification that the general ledger accounting is in accordance with the system recommended by the American Hospital Association.

The government reimbursable cost formula established the principle of the average per diem cost as the most acceptable method of payment. Although the basic weakness of averaging is that no two patients or hospitals are the same, the formula is simple to administer and is readily understood. This principle has been accepted by welfare agencies in Connecticut. The Connecticut Hospital Association has developed a formula and forms which correct the deficiencies of the government reimbursable cost formula but maintain its principles. These forms are set forth in the Cost Accounting Manual of the Connecticut Hospital Association (November 1952).

Neither the government reimbursable cost formula nor the Connecticut reimbursable cost formula attempts to segregate the per diem cost of so-called ward service from the average per diem inpatient cost. While it can be argued that the ward cost should reflect more exactly the cost of service given to welfare patients, the fact that most hospitals are designed so that ward patients and other patients are served from the same nursing station reduces the accuracy of allocating the cost of nursing service between classes of patients. This reduction in accuracy may discredit the hospital's ward cost since nursing service which comprises one-third of hospital expense will be allocated if ward cost is segregated on opinion rather than on fact. Forms and procedures for developing a ward cost have, however, been published by the United Hospital Fund of New York and the Massachusetts Health Department.

Securing Program Acceptance—Step 3

To insure the program's acceptance and introduction, hospital trustees must take the leadership in educating the public, the welfare officers, and the elected officials both about the benefits to be gained from the program and also about the problems of the general hospital in providing the high quality of care which the public has come to expect of the medical, nursing, and related professions. Who is best equipped to assume leadership? Can the welfare officer, who is restricted by statute or ordinance, find time from the pressure of his duties to educate the public? Can the hospital administrator, who is employed to provide patient care and required to balance the budget, command the ear of the public and elected officials? Is not the hospital trustee, who carries without compensation the responsibility for patient care in the hospital and who represents the interest of the public, the logical person to take the lead in educating the public?

The Hospital Trustee, the Leader

It would seem that the hospital trustee is best fitted for this task. Hospital trustees include businessmen, professional men, and enterprising women who are generally established and respected as community leaders. The public is prepared to listen when they speak, and elected officials readily accept the validity of their arguments. They do not have the handicaps of being appointed officials or of being accused of earning their salaries as the welfare officer or hospital administrator might be.

What must the trustee do to secure acceptance of the program? He first must persuade trus-

tees of other hospitals to join with him in accepting the program and in promoting its acceptance. This can be done through the official hospital association or council or through a special committee which represents a majority of community hospitals and which has been set up with this single objective in mind.

Second, time will be saved if the hospital trustee contacts the highest government official in the community—the governor, the county supervisor, or the mayor—in order to explain the difficulty of general hospitals in obtaining more revenue and to secure the appointment of an official study committee whose report it is hoped can eventually be the basis for a legislative proposal.

Third, the hospital trustee must obtain facts. Again the simplest, and the most satisfactory, method of getting the facts is from a uniform accounting and reporting program, one which uses, for example, the standard forms based on the chart of accounts set forth in the Accounting Manual of the American Hospital Association. A set of forms can also be found in the appendix to the Cost Accounting Manual of the Connecticut Hospital Association.

An alternate method, but one which is likely to incur greater expense and usually does not have such a permanent effect, is to have a firm of public accountants prepare a statement of comparative information for each of the participating hospitals.

These facts will be invaluable to the hospital trustee. If they are certified, the facts will limit discussion on the merits of the situation and will quickly gain the acceptance that is the trustee's goal. With the facts, the program will gain a new respect in the eyes of the welfare officer and the elected official, for these men are accustomed to dealing with facts, and from them they can logically proceed to the solution of the problem.

It is at this point that the trustee should provide his greatest leadership. He should be ready with a clearly thought-out program, and he should be flexible enough to adjust procedures without sacrificing principle. He should be ready to demonstrate that the general hospitals are equal partners with the welfare agencies in this program. The hospital, in turn, has an obligation to adjust itself to standard government procedure without permitting government to usurp the hospital trustee's responsibility to provide the best in medical care that the community can afford.

Finally, when the program is ready to be enacted into law, the trustee should lose no time telling the hospital's story and describing the proposed program to the general public. Telling the story orally with the support of visual aids is the most effective method of achieving this end. In a day when the written and spoken word deluges everyone, the public's attention must be captured if the hospital spokesman is to gain acceptance for the program. What does gaining the attention of the public mean? It starts with the hospital's own family, the hospital's patients, their families, and those who contribute to the community chest, and it extends to those who represent the community in the legislature or on the city council. If such a start is made, then there is a place for news releases, editorials, and leaflets. Finally, legislative hearings at the State capitol or in the city hall should be fully attended by the trustee and his supporters in order to capture the attention and understanding of legislators occupied with hundreds of important matters in the public interest.

Results of a Sound Program

Such a program will require the staff work which the busy hospital trustee cannot afford to provide. It will require expert legal advice in the drafting of legislation and in dealing with government officials. It will need skilled public relations advice in dealing with the public, and it will demand effective communication between hospitals. Finally, it will need followup, for the details of putting such a program into operation are many and complicated.

What will be the result? A sound program of hospital reimbursement for the welfare patient will put the general hospital back on a secure footing and will provide welfare patients with hospital care at the time it is most needed. More important, it will insure the continuation of the good medical and nursing care that is the hallmark of general hospitals in the United States.

Milk Sanitation Honor Roll for 1952–53

Ninety-one communities have been added to the Public Health Service milk sanitation "honor roll" and 41 communities on the previous list have been dropped. This revision covers the period from January 1, 1952, to December 31, 1953, and includes a total of 300 cities and 73 counties.

Communities on the "honor roll" have complied substantially with the various items of sanitation contained in the Milk Ordinance and Code Recommended by the United States Public Health Service. The State milk sanitation authorities concerned report this compliance to the Public Health Service. The rating of 90 percent or more, which is necessary for inclusion on the list, is computed from the weighted average of the percentages of compliance. Separate lists are compiled for communities in which all market milk sold is pasteurized, and for those in which both raw milk and pasteurized milk is sold.

The recommended milk ordinance, on which the milk sanitation ratings are based, is now in effect through voluntary adoption in 405 counties and 1,565 municipalities. The ordinance also serves as the basis for the regulations of 34 States and 2 Territories. In 11 States and the 2 Territories it is in effect statewide.

This compilation is from the Division of Sanitation of the Bureau of State Services, Public Health Service. The previous listing, with a summary of rules under which a community is included, was published in Public Health Reports, October 1953, pp. 1015–1018. The rating method was described in Public Health Reports 53: 1386 (1938) and in Reprint No. 1970.

The ratings do not represent a complete measure of safety, but they do indicate how closely a community's milk supply conforms with the standards for grade A milk as stated in the recommended ordinance. High-grade pasteurized milk is safer than high-grade raw milk because of the added protection of pasteurization. The second list, therefore, shows the percentage of pasteurized milk sold in a community which also permits the sale of raw milk.

Although semiannual publication of the list is intended to encourage communities operating under the recommended ordinance to attain and maintain a high level of enforcement of its provisions, no comparison is intended with communities operating under other milk ordinances. Some communities might be deserving of inclusion, but they cannot be listed because no arrangements have been made for determination of their ratings by the State milk sanitation authority concerned. In other cases, the ratings which were submitted have lapsed because they were more than 2 years old. Still other communities, some of which may have high-grade milk supplies, have indicated no desire for rating or inclusion on this list.

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, 1952–53

100 PERCENT OF MARKET MILK PASTEURIZED

Community	*Date of rating*
Alabama	
Auburn	9–24–1953
Birmingham-Jefferson County	7–26–1952
Gadsden–Etowah County	8– 8–1952
Montgomery	5–22–1952
Opelika	6–19–1952
Arkansas	
Fort Smith	10–18–1952
Colorado	
Grand Junction	4–25–1952
Weld County	11–25–1953
Florida	
Pinellas County	1–29–1953
Georgia	
Albany	5–28–1953
Athens	4–16–1953
Atlanta	10–17–1953
Bainbridge	8– 6–1953
Cairo	12–18–1952
Calhoun, Gordon County	8–11–1953
Camilla	11–18–1952
Columbus	2–23–1953
Douglas	10–21–1953
La Grange	3–18–1953
Quitman	4– 9–1953
Savannah	8–15–1952
Tifton	6–18–1953
Valdosta	3–13–1952

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, 1952–53—Continued

100 PERCENT OF MARKET MILK PASTEURIZED

Community	Date of rating
Idaho	
Moscow	9–1953
Indiana	
Anderson	6–18–1953
Bedford-Orleans	10–1952
Berne	3– 3–1953
Bloomington	11–26–1952
Bluffton	3– 6–1953
Calumet Regions	6–12–1953
East Chicago	
Gary	
Hammond	
Cooperative Grade A Milk Program	9–1952
Holland	
Huntingburg	
Jasper	
Crawfordsville	2–28–1953
Elkhart	11–1952
Evansville	6–30–1953
Fort Wayne	10–1952
Indianapolis	10–31–1952
Kokomo	2–11–1953
Lebanon	6–1953
Madison	7–1952
Marion and Gas City	12–15–1952
Mount Vernon	1–16–1953
Muncie	1–28–1953
New Castle	2–1953
Peru	8–27–1952
Richmond	5–15–1953
Rushville	6–1953
Shelbyville	8–1952
Valparaiso	7–31–1952
Iowa	
Des Moines	8–12–1953
Dubuque	11–14–1952
Marshalltown	1–29–1953
Mason City	10– 3–1952
Sioux City	9–18–1953
Waterloo	10– 7–1953
Kansas	
Dodge City	4–20–1953
Hillsboro	11– 7–1952
Kentucky	
Bowling Green	4–17–1952
Calloway County	2–15–1952
Central City and Muhlenberg County	4– 1–1952
Frankfort and Franklin County	7–23–1953
Fulton County	7–23–1952
Hopkinsville	12–10–1953
Louisville and Jefferson County	5–23–1952
Newport and Campbell County	11– 3–1953
Owensboro and Daviess County	8– 6–1952
Owenton and Owen County	4– 2–1953
Paducah and McCracken County	8–18–1953
Pendleton County	4– 2–1953
Warren County	4–17–1952
Williamstown and Grant County	4– 2–1953
Louisiana	
St. Martin Parish	5–23–1952
Mississippi	
Aberdeen	10– 7–1953
Amory	10– 7–1953
Booneville	9– 9–1953
Brookhaven	3–11–1952
Canton	10– 1–1952
Clarksdale	9–25–1952
Cleveland	9– 3–1952
Columbia	7–17–1952
Corinth	6–11–1953
Eupora	3–28–1952
Greenville	8–25–1952
Greenwood	4–15–1952
Grenada	1–22–1952
Houston	5–28–1953
Iuka	7– 9–1953
Kosciusko	1–31–1952
Louisville	9–16–1953
Macon	6–12–1952
Meridian	6–18–1952
Morton	6–17–1952
Natchez	12–17–1952
New Albany	1– 7–1952
Okolona	5–28–1953
Ruleville	4–13–1952
Tupelo	4– 8–1953
Vicksburg	6–13–1952
West Point	1–24–1952
Missouri	
Cape Girardeau	3–15–1952
Jackson	3–15–1952
Kansas City	12– 5–1952
Lebanon	2–13–1953
North Kansas City	12–1952
St. Joseph	1– 9–1953
Springfield	2–13–1953
Warrensburg	12–1952
Nebraska	
Grand Island	9–18–1952
North Carolina	
Alleghany County	9–10–1952
Charlotte	1–11–1952
Clay County	10–27–1953
Craven County	8– 4–1953
Cumberland County	2–15–1952
Davie County	10– 1–1952
Durham County	7–18–1952
Edgecombe County (excluding Rocky Mount)	7–16–1952
Forsyth County	7–16–1952
Granville County	7–21–1953
Guilford County	8– 6–1952
Henderson County	2– 5–1952
Iredell County	10–25–1952
Jackson County	1–17–1952
Lee County	11–19–1953
Lincoln County	3–19–1952
Mars Hill	1– 4–1952
Mitchell County	10–23–1953
Nash County (excluding Rocky Mount)	9–17–1953
New Hanover County	6–10–1952
Onslow County	5– 6–1953
Orange County	6– 9–1953
Person County	3–17–1953
Pitt County	5–15–1953
Rocky Mount	9–18–1953
Swain County	1–17–1952
Transylvania County	2– 5–1952

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, 1952–53—Continued

100 PERCENT OF MARKET MILK PASTEURIZED

Community	Date of rating
North Carolina—Continued	
Wilson County	9–18–1953
Yadkin County	10– 1–1952
Oklahoma	
Ardmore	6–19–1953
Duncan	2– 4–1953
Mangum	1–29–1953
Okmulgee	10–13–1953
Seminole	8–29–1953
Sulphur	2–18–1953
Oregon	
Eugene	6–11–1953
Pendleton	6–19–1953
South Dakota	
North Hill Unit	7–20–1953
Belle Fourche	
Deadwood	
Lead	
Spearfish	
Sturgis	
Sioux Falls	10–25–1952
Vermillion	6–12–1952
Tennessee	
Athens	7–16–1952
Bristol	11– 5–1953
Chattanooga	11–13–1952
Clarksville	1–30–1953
Cleveland	10– 1–1952
Columbia	5–22–1952
Cookeville	6–16–1953
Covington	10–22–1952
Cowan	10–17–1952
Decherd	10–17–1952
Dyersburg	10–23–1952
Fayetteville	6– 2–1953
Franklin	6– 6–1952
Gallatin	7– 8–1953
Greeneville	4–17–1952
Johnson City	8–27–1952
Kingsport	10– 8–1953
Knoxville	8– 6–1953
Lebanon	8– 1–1952
Lewisburg	6–12–1952
Loudon	4– 3–1952
Manchester	10–17–1952
Murfreesboro	7– 2–1953
Nashville and Davidson County	10–28–1953
Tennessee—Continued	
Newbern	12–23–1952
Pulaski	6– 3–1953
Rogersville	4–21–1952
Shelbyville	6–11–1952
Spring City	5–14–1953
Springfield	7– 6–1953
Sweetwater	9–16–1952
Trenton	5– 6–1953
Tullahoma	10–17–1952
Union City	8–12–1953
Winchester	10–17–1952
Texas	
Brenham	4–10–1953
Bryan	6–28–1952
College Station	6–28–1952
Commerce	9– 2–1952
Corpus Christi	9–27–1952
Corsicana	8– 6–1952
Dallas	1– 8–1953
Donna	2–25–1953
Edinburg	2–25–1953
El Paso	10–21–1952
Falfurrias	5– 5–1953
Gladewater	7–26–1952
Harlingen	6– 1–1953
Houston	6–11–1952
Kerrville	7–31–1952
Kilgore	7–26–1952
Lufkin	3– 9–1953
McKinney	2–17–1953
Mercedes	2–25–1953
Mineral Wells	2–11–1953
Mission	2–25–1953
Mt. Pleasant	9–24–1952
Nacogdoches	9–20–1952
Orange	1– 6–1952
Pampa	4– 7–1953
Pharr	2–25–1953
San Antonio	3–25–1953
San Benito	5–30–1953
San Juan	2–25–1953
Sweetwater	2–10–1953
Texarkana	7– 2–1952
Texas City	1–20–1953
Tyler	2–10–1953
Victoria	7–24–1952
Waxahachie	9–30–1952
Weslaco	2–25–1953
Wichita Falls	3–20–1953
Utah	
Logan	5–14–1952
Ogden	11–10–1953
Salt Lake City	4–29–1952
Utah County	6–10–1953
Virginia	
Abingdon	11– 5–1953
Blacksburg	8– 7–1952
Bristol	11– 5–1953
Buena Vista	8– 4–1953
Front Royal	8– 7–1953
Lexington	8– 4–1953
Luray	8– 7–1953
Marion	11–18–1953
Narrows	8– 8–1952
Norfolk	9– 5–1952
Pearisburg	8– 8–1952
Pulaski	8– 7–1952
Radford	8– 7–1952
Richmond	5–21–1952
Roanoke	9–19–1952
South Boston	9– 3–1953
Staunton	11– 7–1952
Suffolk	9–26–1952
Williamsburg	10– 9–1953
Washington	
Bellingham	8–21–1953
Cowlitz County	7–30–1953
Everett	6–22–1953
Port Angeles	9–10–1953
Spokane	9–25–1952
Walla Walla	10–15–1953
Whitman County	6–19–1952
Wisconsin	
Beaver Dam	2–27–1953
Burlington	3–26–1953
Delavan	3–26–1953
Eau Claire	3– 5–1953
Elkhorn	3–26–1953
Fontana	3–26–1953
Lake Geneva	3–26–1953
Manitowoc	6– 4–1953
Ripon	2–27–1953
Sheboygan	6–19–1953
Tomah	5– 6–1953
Waupun	2–27–1953
Williams Bay	3–26–1953

Communities Awarded Milk Sanitation Ratings of 90 Percent or More, 1952–53—Continued

BOTH RAW AND PASTEURIZED MARKET MILK

Community and percent of milk pasteurized	Date of rating
Alabama	
Clanton, 87.2	5–12–1952
Lanett, 97.8	11– 6–1952
Arkansas	
Little Rock, 99.3	4–20–1953
Florida	
Dade County, 99.99	1– 8–1953
Manatee County, 99.57	8–21–1953
Georgia	
Brunswick-Glynn County, 96	11– 6–1952
Carrollton, 94.2	3–14–1952
Cartersville, 97	12–11–1952
Cedartown, 98.3	3–11–1952
Gainesville-Hall County, 93.1	3–21–1952
Newnan, 94.7	6– 5–1952
Pelham, 88.8	11–18–1952
Thomaston, 81.7	4–30–1952
Thomasville, 99.5	6–17–1953
Washington-Wilkes County, 99	9–24–1953
Winder, 97.9	1–23–1953
Kansas	
Pittsburg, 98	11– 7–1952
Kentucky	
Lexington and Fayette County, 97	4–28–1952
Princeton and Caldwell County, 94.7	6–1953
Somerset, 91	2–1953
Louisiana	
Iberia Parish, 94.4	6–1952
Shreveport, 99.9	8–1952

Community and percent of milk pasteurized	Date of rating
Mississippi	
Gulfport, 98	4–30–1952
Hattiesburg, 96	7–31–1952
Jackson, 98.6	9–11–1952
Laurel, 93.6	8–13–1952
Montana	
Missoula, 99.4	9–1952
North Carolina	
Ashe County, 78.7	9– 9–1952
Buncombe County, 97.8	6–25–1953
Cabarrus County, 80.3	1–15–1952
Davidson County, 96.4	7–28–1953
Halifax County, 83.4	4–10–1952
Haywood County, 95	11– 5–1953
Kings Mountain, 83.8	8–18–1952
Lenoir County, 78.4	1–30–1953
Macon County, 91.5	11– 7–1952
Polk County, 87.5	6–18–1952
Robeson County, 96.6	2–15–1952
Shelby, 74.4	6– 6–1952
Vance County, 91.2	7–22–1953
Wake County, 99.3	3– 4–1953
Wilkes County, 91.9	9– 2–1953
Oklahoma	
Ada, 87	7– 8–1953
Elk City, 99	4–17–1953
Enid, 97.3	4– 2–1953
Henryetta, 88	1–16–1953
Hobart, 90	1–23–1953
Lawton, 97	12–20–1952
Muskogee, 99.7	12–12–1952
Norman, 97.7	12–20–1952
Oklahoma City, 97.8	9–28–1953
Ponca City, 95.1	2–11–1953
Stillwater, 98	4–29–1953

Communityand percent of milk pasteurized	Date of rating
Oregon	
Astoria, 97.9	4–22–1953
Portland, 99	5–28–1953
Salem, 99.3	4– 6–1953
Tennessee	
Alcoa, 99.5	9–17–1952
Dayton, 92.1	5–14–1953
Elizabethton, 93.6	11–25–1953
Harriman, 98	10–15–1953
Maryville, 99.5	9–17–1952
McMinnville, 95.3	5– 7–1952
Ripley, 96.9	10–22–1952
Texas	
Beaumont, 99.9	8–15–1952
Brownsville, 96	5–29–1953
Childress, 87	2– 4–1953
Cleburne, 95.5	7–31–1952
Fort Worth, 99.97	2–12–1952
Gilmer, 94.4	1–29–1952
Greenville, 98	9–27–1952
Henderson, 94	1–31–1952
Laredo, 80	9–18–1952
Longview, 99.4	7–26–1952
Lubbock, 99	8–25–1952
Marshall, 87.2	10– 3–1952
Palestine, 88.8	1–15–1952
Paris, 92.6	9–25–1953
Virginia	
Harrisonburg, 96	11–12–1952
Washington	
Seattle-King County, 99.7	6–23–1953
Tacoma, 99.7	8–13–1953
West Virginia	
Clay County, 88	9–16–1952
Kanawha County, 96	6– 6–1952
Nicholas County, 55	9–18–1952

NOTE: In these communities the pasteurized market milk shows a 90-percent or more compliance with the grade A pasteurized milk requirements, and the raw market milk shows a 90-percent or more compliance with the grade A raw milk requirements, of the Milk Ordinance and Code Recommended by the United States Public Health Service.

Note particularly the percentage of the milk pasteurized in the various communities listed. This percentage is an important factor to consider in estimating the safety of a city's milk supply. All milk should be pasteurized, either commercially or at home, before it is consumed.

technical publications

Distribution of Health Services in the Structure of State Government, 1950

Part Three: Personal Health Services Provided by State Government.

Public Health Service Publication No. 184. Part 3, 1953. By Aaron W. Christensen, Evelyn Flook, and Georgie B. Druzina. 1953. 158 pages; tables. 65 cents.

The third of four parts composing the publication "The Distribution of Health Services in the Structure of State Government," this section contains detailed analyses of the work of official State agencies in the field of personal health, and reveals the remarkable changes in State programs of this nature during the preceding decade. The discussion centers about the agencies in each State participating in specific programs, content of the programs, manner of participation, and approximate expenditures. Only State agencies are included, therefore, absence of a particular health service in the State scheme does not mean that the service is not available.

Data presented here indicate a wider variety of health problems were being covered by State health departments in 1950 than ever before. There is increasing emphasis on the chronic diseases. In the communicable diseases, surveillance is being maintained against reintroduction of those diseases which have been practically eradicated, while more active programs in such areas as poliomyelitis, brucellosis, and rabies have been reported in a number of States.

Preventive measures through community services for persons with nervous, mental, and emotional disorders are assuming an increasingly important role. In terms of program expansion, budget, and beneficiaries, mental health activities in 1950 were prominent.

Expansion of State activity for tuberculosis control has had a measurable influence upon mortality from this disease. Tuberculosis death rates dropped approximately 44 percent during the 10-year interval. Early case finding has been the key to this success. Development of mass radiography during the decade has contributed heavily to the large number of persons screened per year. The dramatic reduction in incidence of the venereal diseases can be attributed largely to improved treatment techniques and case-finding and case-holding procedures employed in State venereal disease control programs.

This brochure also includes text and tables on State maternity and child health services, dental public health programs, and services for designated persons suffering from general illnesses and disabilities. Finally, there is a brief discussion of developments in personal health activities of State agencies.

Health Manpower Sourcebook. Section 3: Medical Social Workers

Public Health Service Publication No. 263 (section 3). By Leslie W. Knott, Maryland Y. Pennell, Lucille M. Smith, Ruth Wadman. 1953. 78 pages; tables. 40 cents.

Although medical social work is a relatively young profession, there are approximately 3,825 persons actively engaged in this work. There are, however, three times as many positions open in this field as there are persons to fill them, and it is estimated that 800 to 1,000 graduates a year will be needed to fill the vacancies.

This publication presents for the first time a comprehensive study of the employment, educational background, and personal characteristics of medical social workers. It contains some hitherto unpublished material from the United States Department of Labor and the American Hospital Association, and data from the American Association of Medical Social Workers.

According to 1950 data, upon which this study is based, 41 percent of medical social workers are located in the Northeast section of the country, 23 percent in the North Central, and 18 percent in the South and in the West. Three-fourths of the total are employed in hospitals and clinics and the next two largest groups work with the physically handicapped and other special groups.

In addition to information on place of employment, salaries and related data, the sourcebook contains material on sex and marital status, education and training facilities. Enrollments, capacity and needs of social work schools are also discussed. The text is supplemented with tables and charts.

Abridged Life Tables, United States, 1950

Vital Statistics Special Reports. National Summaries. Vol. 37, No. 12, Nov. 16, 1953; pp. 333–341. Available from National Office of Vital Statistics, Public Health Service, Washington 25, D. C.

The expected length of life for Americans born in 1950 was 68.4 years, a slight increase over the figure for 1949, according to these new abridged life tables. During the last half century, life expectancy at birth increased by about 21 years. Women have fared better than men in this respect, and nonwhites better than whites. The life span has increased by 21.3 years for white and 28.2 for nonwhite women, compared to 18.4 years for white and 26.7 for nonwhite men. However, the life expectancy at birth in 1950 was greater for whites than for nonwhites.

The publication consists of abridged life tables by race and sex for 1950 and 1949, and estimated average length of life in the years 1900–1950. The columns in the life tables are prefaced by explanatory text.

technical publications

Directory of State and Territorial Health Authorities—1953

Public Health Service Publication No. 75. Revised 1953. 62 pages. 25 cents.

The directory, published annually, lists State and Territorial health authorities as well as the officials of State agencies other than health departments participating in grant programs administered by the Public Health Service. Other State agencies included are mental health agencies, hospital planning and construction agencies, and water pollution control agencies. In addition, this year for the first time State agencies other than health departments administering crippled children's services are also included. As in previous editions, health officials of each State are presented on the basis of the State's organizational pattern for carrying out the health activities incorporated in the comprehensive health program. Public Health Service personnel in charge of functions closely associated with State health departments are also listed.

Handbook on Sanitation of Airlines

Public Health Service Publication No. 308. 1953. 31 pages; illustrated. 20 cents.

The first published sanitary guide written expressly for airlines, this publication is the sixth in a series of handbooks concerned with sanitary construction and practices in various branches of the transportation industry. It is intended as a guide to the air transport industry as well as for use by the Public Health Service and cooperating State health departments in their periodic inspections of aircraft and servicing facilities.

The handbook deals with the review of construction plans covering sanitary facilities both for aircraft and for terminal facilities; sanitary equipment and practices at catering points; sanitary food and beverage service, ice handling, and refuse management on aircraft; sanitary control of drinking water; disposal of wastes from aircraft and other items of sanitation.

The handbook was prepared by the Interstate Carrier Branch of the Division of Sanitation, Public Health Service, with the cooperation of the airline and catering industries. As far as airline sanitation is concerned, this manual supersedes the *Sanitation Manual for Land and Air Conveyances Operating in Interstate Traffic.*

Directory of Full-Time Local Health Units, 1953

Public Health Service Publication No. 118. Revised 1953. 58 pages. 20 cents.

The 1953 revision of this directory contains a listing of full-time health units serving local areas, together with the name of the health officer of each unit or other designated administrative head.

A full-time health unit is one which is officially organized to provide medical, nursing, and sanitation public health services during all of the regularly scheduled workweek of the governmental unit to which it is attached and which is under the direction of a full-time health officer or other designated full-time administrative head. Only officials serving on a full-time basis are included.

All units with control vested in local authority are arranged alphabetically by type of organization under "Local Unit." Units in which control is vested in the State are shown under "State District." This year no distinction is made in classification of State districts with respect to type of service performed: that is, direct local service or supervisory and advisory service only.

A summary of the number of full-time units providing local health service in each State and the number of counties served is included as appendix A.

What to Do Now About Emergency Sanitation at Home

Federal Civil Defense Administration Publication H–11–1. 1953. 15 cents.

Prepared with the assistance of the Division of Sanitation, Public Health Service, this handbook is designed to tell the citizen how he can maintain sanitary conditions in the home during the first few days after a disaster which destroys familiar living facilities.

Information given covers safe drinking water, including storage, other sources of liquid, and purifying drinking water; maintaining a safe food supply; emergency cooking; and emergency sewage disposal. The text is supported by instructive illustrations.

This section carries announcements of all new Public Health Service publications and of selected new publications on health topics prepared by other Federal Government agencies.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most Public Health Service publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.